SCIENTIFIC AMERICAN

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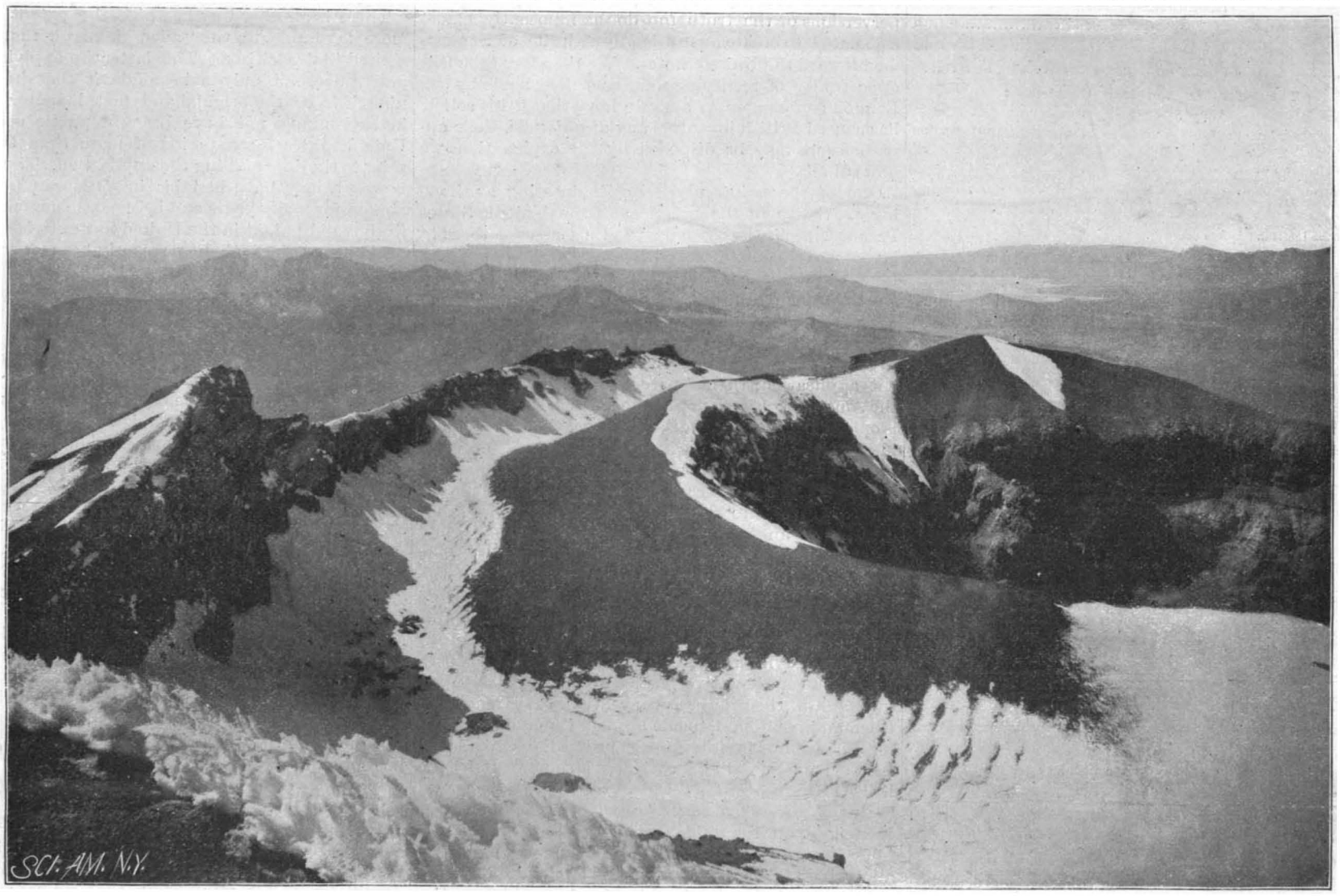

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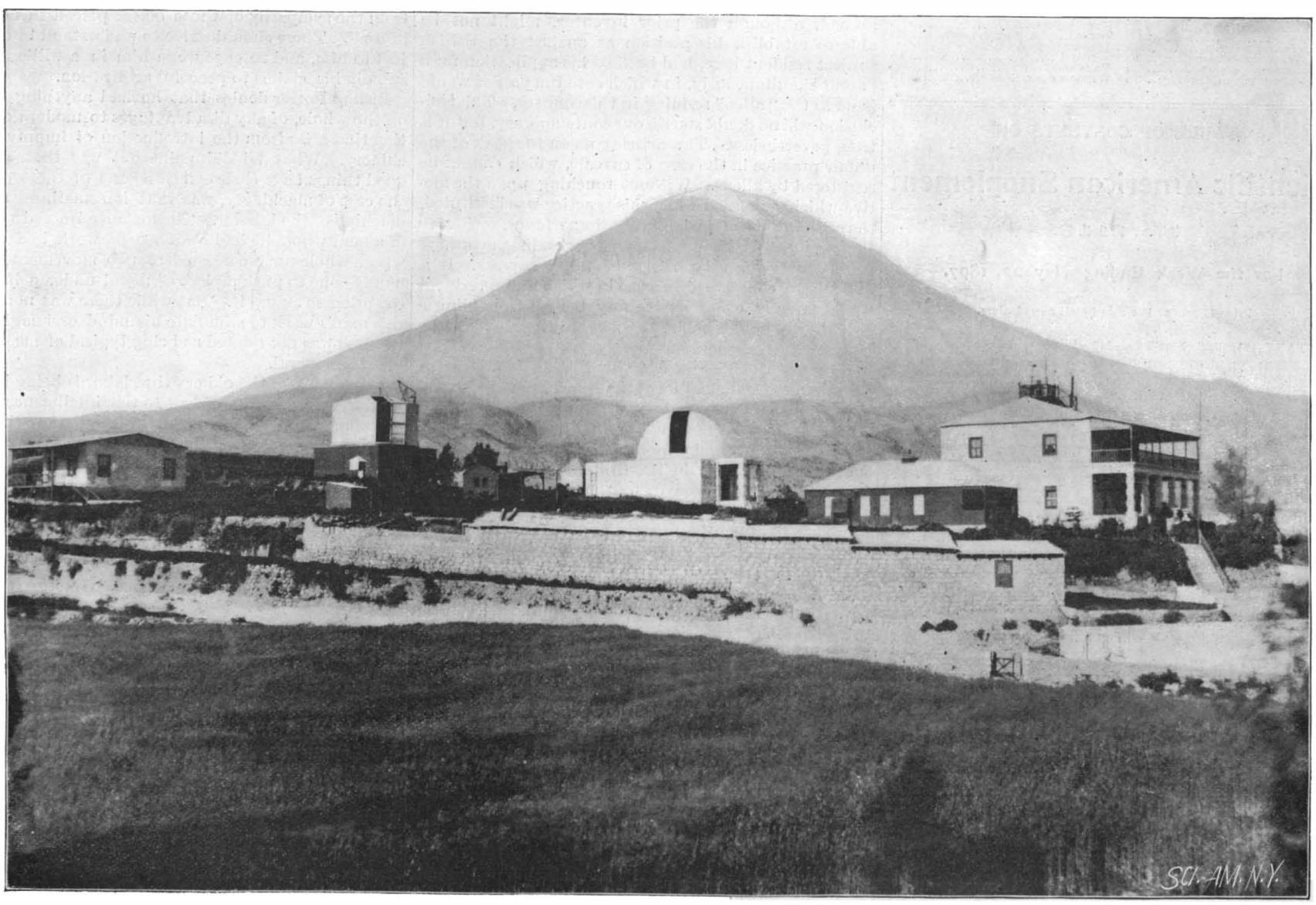

SOUTHERN STATION OF HARVARD OBSERVATORY, PERU.—[See page 329.]

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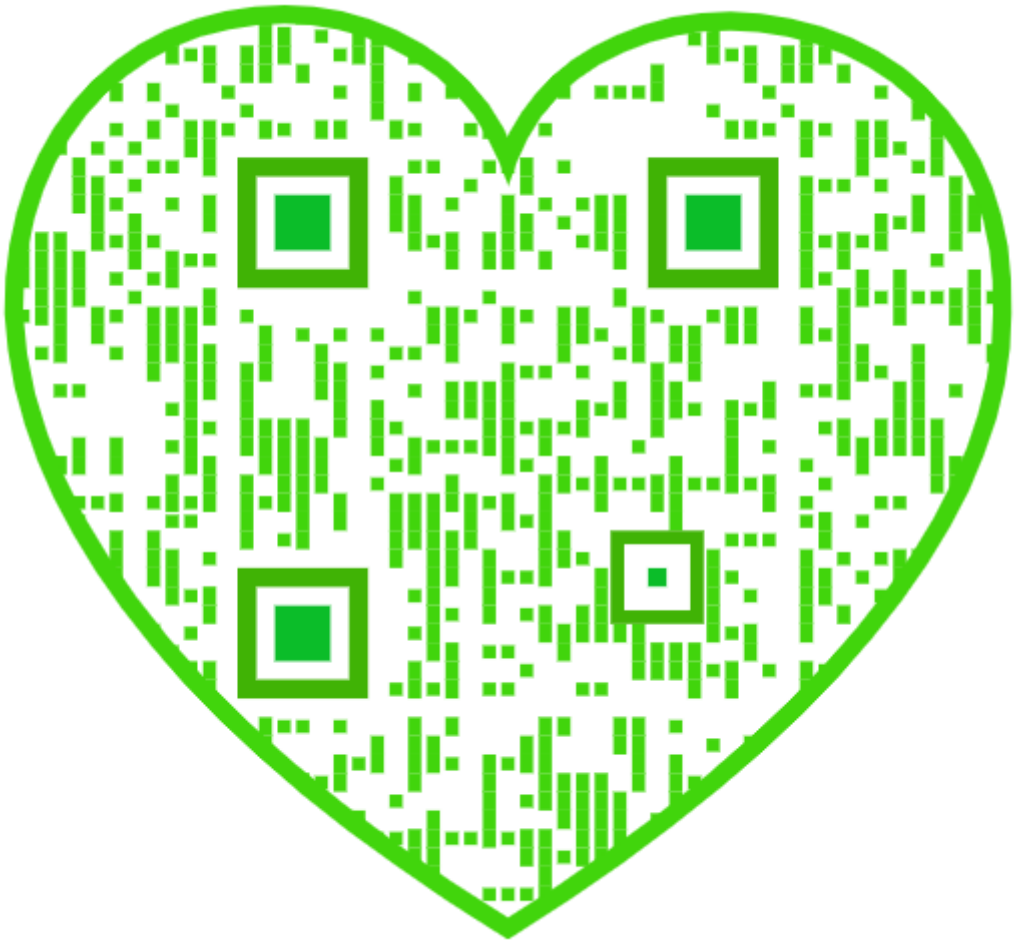

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"UNITED STATES PATENT LAWS."

Under this title the editor of London Engineering publishes in a recent number of that admirable periodical a rather lengthy criticism of the patent laws, or rather of the patent practice, of the United States. The article is given particular prominence by appearing in a journal which has always shown a most friendly spirit toward American institutions, and is remarkable in its tendency to create the impression that the "alien" inventor will receive unfair treatment at the hands of the United States Patent Office. The writer enumerates several alleged "disadvantages that aliens suffer in the United States," and his statements, while not always actually incorrect, are in many instances perversions of the truth (no doubt innocently made) calculated to create an unfriendly attitude of Englishmen toward the United States. We therefore take this opportunity of rectifying some assertions made by our London contemporary, and we hope that if his article has caused British inventors any disquietude, their apprehensions may be dispelled by the explanations we now submit.

One of the points urged by Engineering as showing partiality in the practice of the United States Patent Office is thus stated: "Let us assume there to be before the United States Patent Office two applications for patents for one and the same invention, viz., one by a British subject and one by an American citizen, also that the British subject was in reality the earlier inventor of the two, but had not given publicity to his invention before lodging his United States patent application; then a patent would be granted to the American citizen, not to the British subject. This is only one of the many disadvantages that aliens suffer in the United States."

We may state, without any reservation, that the citizenship of an applicant for a United States patent does not enter into the equation in any way, and that in this case an American citizen does not enjoy any special privileges simply because of his nationality. The natural inference from the above quotation is that the patent will issue without ado to the American citizen and that the "alien" will be unjustly deprived of his rights. Of course this is entirely untrue. In the event above stated interference proceedings would be instituted and the respective parties would be called upon to establish the priority of invention. It is true that, when an invention is made abroad, it may be difficult for the inventor in interference proceedings to adduce such evidence as will be considered competent by the United States Patent Office and by the United States courts. This matter of evidence is dependent entirely upon the residence of the parties and the jurisdiction of the tribunals before whom they appear, and has nothing whatever to do with the citizenship of the parties. So far from this practice working an injustice, the proposition quoted above might be reversed and an American citizen residing abroad, although the prior inventor, might not be able to establish his position as against the British subject resident here, had he filed his application for a patent simultaneously, in which case the patent would issue to the "alien" residing in this country. This conclusion will no doubt startle our contemporary, but it is true, nevertheless. The article goes on to speak of the unfair practice in the case of caveats, which cannot be registered by aliens. Without touching upon the motive which governed when this practice was instituted, the criticism is of insignificant importance, owing to the prejudice which exists among leading attorneys against the general practice of filing caveats. It is difficult to conceive of a case in which a non-resident would in any event derive any benefit from filing a caveat. It should be borne in mind that it offers no "protection" as such, but simply entitles the caveator to notice of the filing of a similar application.

In discussing the merits of the International Convention, the writer goes on to say: "Furthermore, it is of interest to note that unpatented and unpublished inventions existing in foreign countries are not presumed to be known in the United States, and, therefore, as the first to convey to the public any knowledge of the invention, a person who independently, though subsequently, invents and patents the same thing there, would seem to be regarded as the first inventor within the true meaning and intent of the law." This certainly is quite proper. The whole spirit of our patent system is to discourage delay and neglect in the introduction of inventions. If a party has been guilty of laches or negligence in the patenting or publication of his invention, he must suffer the consequences.

It seems rather strange that such criticisms should proceed from Great Britain, whose attitude toward the true inventor, and particularly the true foreign inventor, is certainly anything but liberal. An American who has unwittingly allowed his United States patent to issue before filing his British patent, unless he still has time to avail himself of the provision of the International Convention (seven months), forfeits the right of procuring in the United Kingdom a valid patent. The Englishman, on the contrary, may have patented his invention in England and may have been enjoying the fruits of his invention for many years and may still apply for and obtain a perfectly valid United States patent. He is allowed, in other words, to test the practicability and the value of his invention before being compelled to file his application here. Not so, however, with the American inventor. He is compelled to take out his British patent when, perhaps, his invention is still in an experimental stage, and certainly before its merits and practicability have been tested. Furthermore, in England a patent will be issued to him who first imports the invention into the United Kingdom, irrespective of the fact of his being the true inventor or not. This opens the way to many irregularities, and the real inventor can readily be deprived of the fruits of his discovery.

There is another way in which the patent laws are more favorable to the "alien" inventor than to the United States citizen. The latter in applying for a patent does not only make affidavit that he believes himself to be the original and first inventor, but the invention must not have been in public use in the United States for a period of more than two years prior to the date of filing the application. The "alien," however, may have had his invention in public use abroad for many years and he can still procure a perfectly valid patent in the United States.

The new law which has recently been enacted, and which comes into operation on January 1 next, provides that foreigners will be compelled to conform to the practice established by the International Convention, and file their applications within seven months of the date of filing the applications in the country of origin.

We believe in a broad minded attitude toward foreigners, and it is for the benefit of the country that the patent laws as regards foreigners should be liberally interpreted, but we believe that in the past, if we have erred at all, we have erred on the side of too great a liberality.

BISHOP POTTER ON LABOR AND MACHINERY.

The sensational element in the New York daily press has been putting into Bishop Potter's mouth words which he never uttered, the tenor of which would make out the reverend gentleman to be at once an advocate of strikes and strongly opposed to machinery on the ground that its introduction was prejudicial to the interests of the workingman. The offending articles were supposed to be reports of an address delivered at the annual dinner of the Church Association for the Advancement of the Interests of Labor. Bishop Potter has subsequently stated that the comments upon these subjects attributed to him are based wholly upon fictitious statements.

The point that was actually made was that the Church Association for the Advancement of the Interests of Labor should fulfill the office of mediator and conciliator, and it was shown that strikes were often the result of the workingman's sense of his isolation from the sympathy of his fellow men, and especially from the sympathy of those better placed in life than himself. These should strive to understand him, to be just to him, and to encourage him in a willingness to submit his claims to peaceful arbitration.

Bishop Potter denies that he had anything to say, on the whole, of any disadvantages to modern civilization that arise from the introduction of improved machinery. What he did point out was that, as most good things have their evil sides, one of these evils, in the case of machinery, was that it sometimes made a machine of the laborer. The instance quoted was that of a man whom he had watched at work in a factory, whose whole duty consisted of two movements of his hands—one to push a piece of metal under a hammer, the other to stamp it. But while there was nothing in this man's work to stimulate his mind or imagination, the case was not quoted as being typical of mechanical labor in general.

The fallacy of the old cry that labor is being hurt by machinery is plainly evident to the intelligence of the working classes, who have learnt long before this that for every trade that machinery has displaced it creates half a dozen new ones.

THE INVENTOR OF THE AUTOMATIC GUN.

The invention of the automatic gun has been universally attributed to Mr. Maxim for so long a time that it seems a little late in the day for the editor of the Admiralty and Horse Guards Gazette (Eng.) to undertake to prove that the credit of the invention belongs, not to Mr. Maxim, but to somebody else.

It seems that the present attack was prompted by a paper which was read by Mr. Maxim before the Royal United Service Institution on the subject of "Automatic Guns," in the course of which he exhibited his original model, which now forms part of the South Kensington Museum collection, and spoke of it as "the first apparatus ever made on this planet which would load and fire itself." The editor of the Admiralty and Horse Guards Gazette disputed Mr. Maxim's claim, and said that he should have made mention of the weapons invented by such men as Gatling, Gardner and Nordenfelt. Mr. Maxim made the obvious reply that the lecture was confined strictly to automatic guns, and that it would have been out of place to drag in the

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names of any of the thousand and one guns that are non-automatic. This led the editor of the paper in question to write a series of bitter articles tending to show that Blakeley, Vavasour, Moncrieff and others had made automatic guns before Mr. Maxim took out his patent.

Mr. Maxim, in a very characteristic and effective reply, points out that the merit of his invention is proved by the fact that it very soon took the place of all other machine guns, driving them out of the field. It was so superior to the hand-operated guns that it was adopted by nations which, up to that time, had not admitted a machine gun into the service. "If the automatic system was so well known," Mr. Maxim pertinently asks, "why was it not taken up before? . . . Why did all Europe wait for a 'Yankee' to come to Europe and make an automatic gun for them?" An investigation of the patents quoted by the Admiralty and Horse Guards Gazette showed that the greater part of them did not relate to anything that could be twisted into meaning an automatic gun.

Mr. Maxim draws a parallel between this attempt to discredit him as an inventor and the attack on Mr. Bessemer in connection with the Kelly patents for making steel, and we think his contention is a sound one. We deprecated the course taken by Mr. Weeks in the Bessemer-Kelly matter as not being justified by the facts and as causing unnecessary annoyance to a distinguished inventor and great benefactor of the race. So, too, in the present controversy we think the editor of the paper in question has entirely failed to make good his point, and has sought in vain to cast a shadow upon the title of Mr. Maxim to be the originator of the type of gun which bears his name.

THE BERLINER TELEPHONE TRANSMITTER PATENT SUSTAINED.

The decision of the United States Supreme Court on May 10, 1897, sustaining the decision of the United States Court of Appeals, rendered May 18, 1895, and which, in turn, was a reversal of a decision given in favor of annuling the Berliner (November 17, 1891) microphone patent by Judge Carpenter, of the United States Circuit Court in the District of Massachusetts, on December 18, 1894, will, without doubt, interest all users and manufacturers of telephones, and in some degree confirm the popular belief that the issue of the patent was purposely delayed to aid the extension of the monopoly in the telephone business so long enjoyed by the American Bell Telephone Company.

The record of the several decisions regarding this patent will be found in previous issues of the SCIENTIFIC AMERICAN as far back as 1893, when the suit to annul the patent was begun by United States Attorney General Harmon. The facts in the history of the case are that the application for the patent entitled a "Combined Telegraph and Telephone" was filed on June 4, 1877. The claims are said to be generic, covering the microphone and the art of microphony. Three years later, in September, 1880, Berliner filed a second application for a patent on apparently the same invention, under the title of an "Electric Telephone," which was claimed to be a division of the first or original application. Two months later this patent was issued, November 2, 1880. Subsequently the board of examiners-in-chief decided that the 1880 patent was for an invention distinct from the patent of 1891, and also that the additional new matter put into the first application was allowable. The claims of the 1880 patent describe an apparatus for reproducing sound by means of a varying electric current passing between two electrodes in contact. The patent expires November 2, 1897.

Some time prior to 1880 Berliner assigned his rights in both applications to the American Bell Telephone Company, and later, discovering the advantage of the carbon transmitter, amended the 1877 application by erasing the entire specification and drawings and substituting another drawing and specification, with new claims more in accordance with the state of the art as it was then understood. The drawing resembled identically that in the patent of November 2, 1880.

In 1882 Berliner claimed that a patent was to be allowed on the amended application, but, in consequence of a rejection, somewhat unexpectedly, of all the claims and subsequent appeals, a further delay was incurred.

Then, again, subsequent interference proceedings ensued, appearing perfectly proper and legitimate on their face, but in reality were fathered on both sides by the telephone company, enabling the latter by the usual methods of agreement or understanding between opposing counsel to delay a final decision until such time as they desired it to be made. This was in November, 1891, just after the United States Supreme Court decided adversely the claims of Drawbaugh.

It is interesting to note that the claims allowed in the 1891 patent described an electric telephone transmitter in which the sound waves vary the pressure between electrodes in constant contact, and thereby vary the resistance in a constant electric circuit, to accord with vibrations of a diaphragm plate.

The operation is so similar to that of the 1880 patent that there would seem to be good ground for contest in the future, on the assumption that one applicant cannot hold two patents for the same invention.

The grounds upon which the government asked to have the 1891 patent set aside were that the delay of fourteen years in the granting of the patent was fraudulent and due to corruption of the Patent Office officials by the owners of the application (the telephone company) or to collusion; and, second, that the patent of 1880 covered the same ground as the later patent of 1891.

Justices Gray and Brown took no part in the decision. Justice Harlan dissented, without giving an opinion. Justice Brewer delivered the opinion of the court, which was in part substantially as follows:

"Mr. Bell had invented the telephone, and, as that patent had expired, all the monopoly which attaches to it alone has ceased and the right to use it has become public property. But his apparatus was insufficient for public uses. Berliner's patent supplied the deficiency of existing patents, as he invented something by which, taken in connection with Edison's and Blake's inventions, Bell's undulating current could be made practically available for carrying on conversations at long distances. In other words, the telephone used to-day is not only that of Bell, but of Edison, Blake, and Berliner as well. Therefore, the right to use the Bell patent alone would be a barren one, extending the telephone patent to life of the Berliner patent.

"An application for patent cannot be considered and determined on the instant. Hence there could be no complaint on the mere fact of delay, though there might be of its excessiveness. But, it mattered not whether the delay be reasonable or unreasonable, if the applicant is not responsible for it. If the fault was that of the Patent Office, the applicant is not held blameworthy, and his legal rights are not affected. He cannot be punished on account of the delay or negligence of the tribunal before which he is presenting his suit.

"If there should be a new invention upon the expiration of the Berliner patent, the rights of its author could not be abridged to relieve the public. The inventor of the latest addition is entitled to full protection, and if the telephone company buys that invention, it is entitled to all the rights which the inventor had. The court dissents entirely from the views urged by counsel that the applicant for a patent is a quasi trustee for the public, but holds that an invention is the absolute property of its inventor. The government, in order to make its case, must establish affirmatively that the delay in the Patent Office was caused by the conduct of the applicant. It cannot rest on mere inferences, but must prove the wrong in such a manner as to satisfy the judgment before it can destroy that which its own agents have created. This requirement the government had failed to meet.

"There was no testimony as to any corruption of the officers of the department by the defendants, or any attempt at such corruption. So far, indeed, as was shown, there never was an intimation made to a single official that he could profit by a moment's delay. All thought of wrong, therefore, may be put aside."

Of the contention that a patent issued November 2, 1880, upon a division of the original application, covers the same invention as that covered by the patent in suit, and exhausted the power of the Commissioner as to that invention, he said "the patent of 1880 was for a receiver, while that of 1891 was for a transmitter. It was claimed that the two inventions were one, but the decision of the Patent Office was against this contention, and this judgment could not be reviewed in the present suit."

"Congress had established the Patent Office, and had thereby created a tribunal to pass upon all questions of novelty and utility, and had given to that office exclusive jurisdiction in the first instance, with specifications of circumstances under which they might be reviewed.

"It would seem that the government should be as firmly bound by the decision of its own tribunal as individuals. There might, he concluded, have been an error on the part of the officials as to the existence of power or a mistake in the instrument itself, sufficient to justify a decree canceling the patent. Also, the deviation of the proceedings between the application and the patent may be such as to justify the interposition of the court of equity; but it was not intended that the courts of the United States, sitting as courts of equity, could entertain jurisdiction of a suit by the United States to set aside a patent for an invention, on the ground of error of judgment on the part of the patent officials. Hence this question was not now open for consideration."

The conclusions of Justice Brewer were as follows:

"We hold in respect to a suit to set aside a patent for an invention that, as in cases brought to set aside patent for land, the government must establish the grounds of relief by testimony which is clear, convincing and satisfactory, and not upon a mere preponderance of testimony.

"We also hold that there is no evidence in the record—not the slightest—that there was any corruption or undue influence exercised by the officials of the telephone company to secure any delay in the Patent Office; that there is no evidence which justifies an inference that the delay was either at the instance or with the procurement or at the solicitation of the telephone company or its officials, and that whatever delay there was, was caused by the action of the officials of the Patent Office, for which the telephone company is not responsible.

"We hold, therefore, that there is an absolute failure to show any wrong on the part of the telephone company in this delay in the Patent Office; and as to the other grounds of attack, they are matters which, under the statute law, are open to every individual to set up in a suit brought against him by the holders of the patent, and that so far as these particular matters are concerned, they are not such as to justify the interference of a court of equity to set aside the patent.

"The decree of the court below is affirmed."

This is said to be the first case of an application by the government to annul a patent for an invention on the ground of fraud. The decision of the court in defining the difference between a patent of land and a patent on an invention is commendable, especially when it dissents from the view taken by the counsel for the government that an applicant for a patent is a quasi trustee for the public.

The court holds, on the contrary, that an invention is the absolute property of the inventor, emphasizing the intent of the patent law that a mental conception resulting in a perfected invention belongs strictly to the inventor. But as a compensation for its disclosure a patent is granted, wholly negative in character, since it gives the inventor nothing he did not have, but acts merely as a bar to the unauthorized use of his property by others.

The court left undetermined the question of the validity of the patent of 1891 as related to the prior patent of 1880 for apparently the same invention. Until this question has been adjudicated, the validity of the later, 1891, patent may be doubted. In the meantime, however, until such a contest is brought about, it may be supposed that the telephone company considers it has a monopoly of telephone transmitters until 1908, about thirty years after the date the original application was filed.

AN ADVANCE IN THE ELECTRICAL EQUIPMENT OF STEAM RAILROADS.

For several months past the directors of the New York, New Haven and Hartford Railroad have caused preparations to be made for the converting of an old steam railroad (a section of the New England Railroad) paralleling their tracks between the cities of New Britain and Hartford, Conn., a distance of some thirteen miles, into an electrically equipped road, with a view of testing practically the possibilities of electricity as a motive power in actual railroading.

At Berlin, Conn., located near one end of the road, has been built a mammoth power station, and on the roadbed, between the rails, a third iron rail, elevated about six or eight inches above the level of the roadbed, has been laid, supported on creosoted wood posts, the rail having the shape of an inverted V. Such construction does not interfere with the use of the road by the usual steam locomotives.

A preliminary official trial, in the presence of the president, Charles P. Clark, and directors of both roads, was made on May 10, Col. H. H. Heft, chief of the electric power department, having charge of the controlling switch, and the first trip was made from Berlin to New Britain, a distance of two and one-half miles, in six minutes, and then on to Hartford, the whole trip taking but eighteen minutes. The position of the car was readily maintained at an even headway between two trains drawn by locomotives, proving that it is possible to utilize both kinds of motive power on one track at the same time. The motor car, of the open excursion type, weighed 32 tons and carried 70 persons, and was propelled by an electric motor of 125 horse power. The current was produced at the dynamo at a pressure of 660 volts. Six 110 volt incandescent lamps in series at the further end of the line, thirteen miles distant, burned brightly, showing that the electrical pressure was more than sufficient to move the train, and also how easily the current is carried that distance without supplementary feeder wires and with no appreciable loss by leakage.

The current is conveyed to the car motor from the third rail by a sliding iron shoe, and returns by way of the rails.

It is estimated the cost of equipping a road on this plan is about one-fifth that of a trolley line.

All stations have been fenced in and danger notices put up along the tracks to warn pedestrians and workmen. It is expected some time this month the trains will run regularly every twenty minutes between the two cities.

THE ETNA RAILWAY in Sicily, which will be completed in a few months, begins at Ripasto and terminates at Catania, is 72½ miles long, and nearly the whole distance is already opened.

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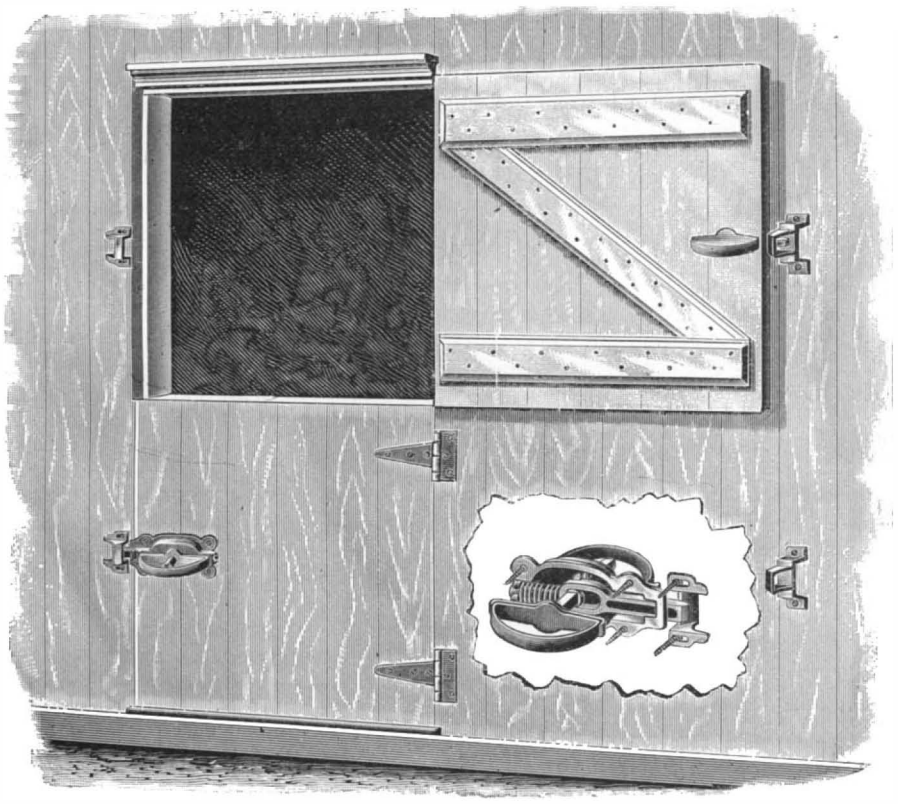
AN EFFICIENT LATCH FOR HEAVY DOORS.

A latch especially adapted for use on heavy and thick doors, such as those of barns and other outbuildings, etc., is shown in the accompanying illustration, and has been patented by Harris M. Whitcomb, of Albany, Ind. It has an oblong metal case with lateral flanges having countersunk holes, for attachment to the inner side of a door by screws, a central lengthwise slot adapting it for the detachable connection of one of the handles that operate the latch bolt. A washer on the outside of the door has a slot corresponding to the slot in the case, and the bolt or latch has an enlarged central slotted portion, one end of the bolt being round and surrounded by a spring, while the other end is square and beveled at its extremity to engage a beveled



WHITCOMB'S BARN DOOR LATCH.

catch on the door jamb, a similar catch on the casing or wall holding the door open when desired, as shown in the engraving. One of the bow handles is rigidly connected with a rectangular spindle, and the other handle has a hub with a square mortise opening to receive the spindle and lateral arms that engage and operate the latch bolt. The bolt may be disengaged from the catch by seizing and turning either handle, and as the door is swung open the latch bolt automatically engages the catch on the wall. The latch is adapted to doors of different thicknesses, as the spindle of one handle may be readily adjusted in the mortise of the hub of the other handle.

American Institute Fair.

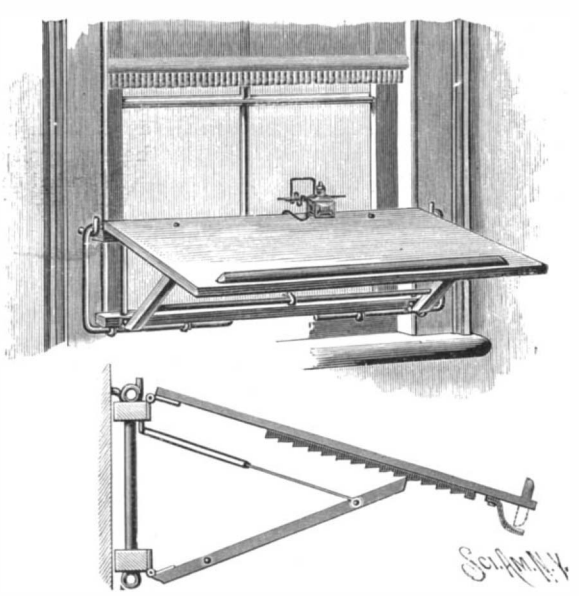
The sixty-ninth fair of the American Institute will be held at Madison Square Garden, from Monday, September 20, to Thursday, November 4, next. The board of trustees has selected Mr. A. Chasseaud to be the managing director of the fair. The institute has established a temporary office in the tower of the Madison Square Garden. The idea of the managing director is to amplify the departments that have been regular features of the American Institute Fair in the past years. He will inaugurate new ways which will add greatly to its scope and usefulness. Especial effort will be made to obtain a representative exhibit of new machinery, inventions and chemical processes. There is no good reason why the fair of the American Institute should not revive the old time interest which was felt in it.

The Manufacture of Guns in the United States.

It is stated in the report of the Secretary of the United States Navy that: "During the past four years 213 guns have been manufactured of all calibers, as follows: seventy 4 inch, seventy-one 5 inch, six 6 inch, forty-five 8 inch, one 10 inch, eight 12 inch, twelve 13 inch. Including the twenty sets of 4 inch, thirty-five sets of 5 inch, fifty sets of 6 inch, and two sets of 8 inch gun forgings, for which contracts have been awarded, we have in course of manufacture at this date 196 guns of all calibers from 4 inches to 13 inches. Of these, sixty-three guns are for the auxiliary naval cruisers, for which an appropriation was made at the last session of Congress. In addition to the above, 100 3 inch field guns, for landing and boat service, are in hand and will be completed in the near future. March 1, 1893, 116 guns of all calibers were mounted aboard ship. At present, including some temporarily landed pending repairs of vessels, there are 366. Our projectiles of all calibers are manufactured by private firms, of which there are at least seven possessing the necessary plant and skill for the manufacture of the various kinds required. Armor piercing shells are now being supplied to the navy capable of withstanding the test of passing through a caliber of hard-faced armor quite as well as those of earlier manufacture did that of passing through a caliber of simple steel. A new type of shell, called semi-armor-piercing, has also been developed to meet the modern practice of armoring large portions of heavy ships with armor from 4 inches to 6 inches thick. These shells will carry large bursting charges through half a caliber of armor, and explode after having gone through." It cannot be said that the manufacture of guns in the United States is very rapid. Perhaps it is fast enough, however, to keep pace with the building of their ships. The following quotation from the American Engineer's review of an article on "The Engineer in Naval Warfare" may be of interest in this connection: "The manufacture of guns has been chiefly in the hands of the line officers. This policy has not been productive of good results; for, while the largest rapid-fire guns in our navy are 6 inches—and there are only a few of them—other navies are mounting rapid-fire guns up to and including 8 inch. Other nations are obtaining greater muzzle velocities for nearly all calibers than are derived in our own practice. Other navies have developed wire-wound guns, by which greater strength, less weight, and ultimately less cost and time required for manufacture are attained. Our navy has done nothing in this respect. The army is experimenting with such a weapon. We do not say this in a spirit of reflection on our ordnance officers. We all know that private firms, with their facilities for experiment, and with some government encouragement, can always outstrip the governmental shops. Our ordnance will continue to be inferior to that of other nations until private firms in the United States manufacture heavy guns like Armstrong does at Elswick, Krupp at Essen, and Canet at Havre."

A CONVENIENT WINDOW DESK.

A simple form of desk which may be quickly put up at or removed from a side wall, partition or window casing, and regulated to any desired angle, being also adjustable lengthwise to accommodate it to any width of window, is shown in the accompanying illustration, and has been patented by William A. Roos, of No. 512 West Forty-eighth Street, New York City. The leaf is hinged to the upper members of light frame sections, on which are adjustable extension pieces formed of metal rods movable through eyes, the extension pieces being engaged by hooks in the window casing. The leaf is held at any desired angle by hinged arms engaging racks on the under side of the leaf as shown in the sectional view, the arms being connected by cross bars and being yieldingly held against the racks by a spring, which may consist of a simple rubber strap. The inventor has a novel form of inkstand, covered by another patent and especially adapted for use with this desk. The rib on the front edge of the leaf is preferably made removable, and may be secured on the under side of the leaf if desired.



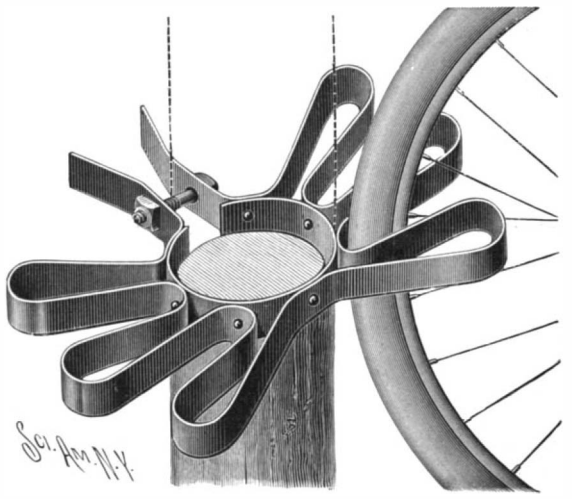
ROOS' WINDOW DESK.

Government Crop Report, 1896.

The crop report of the Department of Agriculture says: "The estimates by States and Territories of the area, product and value of the principal cereal crops of the United States for 1896, made by the statistician of the Department of Agriculture, are as follows: Corn area, 8,627,000; product, 2,283,875,000; value, $491,007,000; yield per acre, 28·2 bushels; farm price per bushel, 21·5c. Winter wheat area, 22,794,000; product, 267,934,000; yield per acre, 11·8 bushels. Spring wheat area, 11,825,000; product, 159,750,000; yield per acre, 13·5 bushels. Total wheat area, 34,619,000; product, 437,684,000; value, $310,603,000; yield per acre, 12·4 bushels; farm price per bushel, 72·6c. Oats area, 27,566,000; product, 707,346,000; value, $132,485,000; yield per acre, 25 7 bushels; farm price per bushel, 18·7c. Rye area, 1,831,000; product, 24,369,000; value, $9,961,000; yield per acre, 13·3 bushels; farm price per bushel, 40·9c. Barley area, 2,951,000; product, 69,695,000; value, $22,491,000; yield per acre, 23·6 bushels; farm price per bushel, 32·3c. Buckwheat area, 755,000; product, 14,090,000; value, $5,522,000; yield per acre, 18·7 bushels; farm price per bushel, 39·2c. Potatoes, area, 2,767,000; product, 252,235,000; value, $72,182,000; yield per acre, 91·1 bushels; farm price per bushel, 28·6c. Hay area, 43,260,000; product, 59,282,000 tons; value, $388,146,000; yield per acre, 1·37 tons; farm price, $6.55 per ton. Tobacco area, 595,000 acres; product, 403,004,000 pounds; value, $24,258,000; yield per acre, 678 pounds; farm price, 6c. per pound."

A SIMPLE BICYCLE HOLDER.

The device shown in the illustration is designed to be readily attached to or removed from a pillar, post, or other convenient standard, and by engaging the tire of the rear wheel of a bicycle with the holder, several machines so held will be separated at the front, so that



RISDON & POOLE'S BICYCLE HOLDER.

the handle bars of adjacent machines will not interfere. By reversing the device bicycles may be held at different angles to the support, and the holder does not engage the rim or the spokes, avoiding the possibility of injuring the machine. This holder has been patented by Thomas Poole and Edgar S. Risdon, and is being manufactured by Risdon & Poole, No. 19 Jennie Street, Trenton, N. J. The device is made of a strip or band of metal crimped to form alternate loop arms and intervening spaces, the ends of the band being carried outward to form opposing jaws which may be drawn together or toward each other by a bolt and nut. The body of the holder is preferably attached by rivets to a central tie band. The holder may be made with any desired number of loop arms and intervening spaces.

Business Ninety-six Years Ago.

Not only was the field of business enterprise restricted, but the transaction of business within that field was slow and difficult. The merchant kept his own books, or, as he would have said, his own accounts, wrote all his letters with a quill, and when they were written let the ink dry or sprinkled it with sand. There were then no envelopes, no postage stamps, no letter boxes in the street, no collection of the mail. The letter written, the paper was carefully folded, sealed with wax or a wafer, addressed and carried to the post office, where postage was prepaid at rates which would now seem extortionate. To send a letter, which was a single sheet of paper, large or small, from Boston to New York or Philadelphia, cost 18½ cents, and to Washington 25 cents, and this at a time when the purchasing power of a cent was five times what it is at present. To carry a letter from Philadelphia, then the capital of the United States, to Boston and bring back an answer by return mail would have consumed from twelve to eighteen days, according to the season of the year and the weather.—Portland, Me., Board of Trade Journal.

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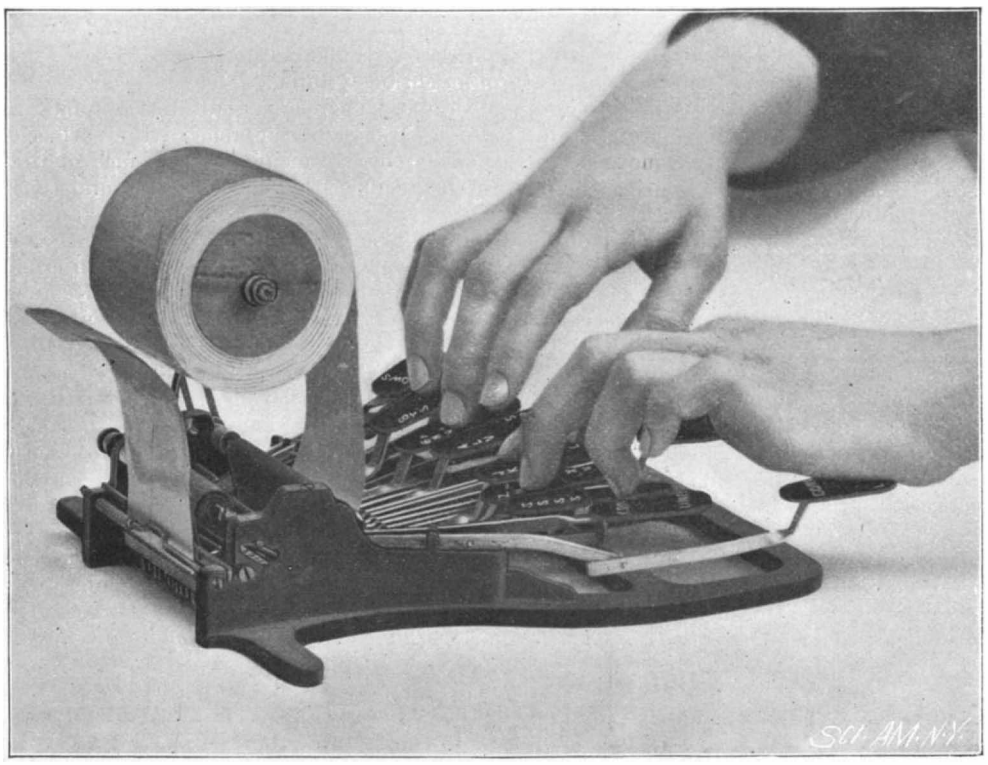
Dr. Nansen on the Prevention of Scurvy.

Dr. Nansen, in his lecture at the Albert Hall on "Some Results of the Norwegian Arctic Expedition," among other highly interesting matters touched upon one of great medical interest. We all know the difficulty that has been experienced, and has always to be encountered, on such expeditions, and frequently in those of a military nature, in regard to scurvy, a malady which has hitherto been usually found to occur in Arctic explorations. Dr. Nansen ventured to declare that it was very easy to avoid that disease by taking proper precautions, and he proceeded to relate his experience: "Dr. Torup, professor of physiology at the University of Christiania, had come to the conclusion, after examining the subject, that scurvy must arise from poisoning, caused, in particular, by badly preserved meat and fish. He thought that in the decomposition which takes place in the meat from bad preserving—in salt meat, for instance—there was poisonous matter allied to the so-called ptomaines, which, when constantly partaken of, engendered the malady we call scurvy. Particular attention was paid to this at the time of their equipment, and from their experience and the investigations he had the opportunity of making during the journey, he could entirely subscribe to Torup's opinion in this matter. It was to be hoped that in a near future there would be scientific elucidation of this important point; and it was equally to be hoped that certain means for avoiding this hitherto so fateful sickness might be shown." Whether this supplies a key to the explanation of all the outbreaks of scurvy that have occurred, it would be premature to declare; but it marks a new departure, and is well worthy of further investigation. Meanwhile, we think it may possibly account for some of the outbreaks about which a difference of opinion existed as to whether they were to be entirely explained by the absence of fresh vegetables.—Lancet.

A SHORTHAND TYPEWRITER.

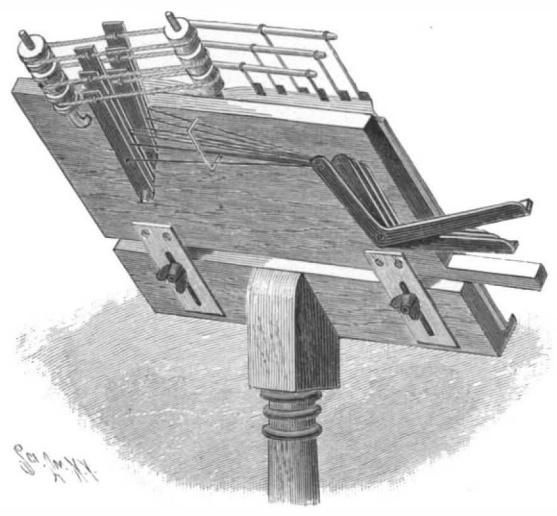
In 1893 there appeared in the SCIENTIFIC AMERICAN an illustration and description of a small typewriter designed especially for rapid work, having but a limited number of keys, arranged to be covered simultaneously by the fingers of both hands, and enabling the operator to make a good and rapid stenographic report on the typewriter itself. The machine was the invention of Mr. G. K. Anderson, of Nos. 97 and 99 Nassau Street, New York, and the accompanying illustration represents an improved machine of the same class, for which a patent has been recently issued to the same inventor. As will be seen, the characters are printed transversely across a continuous strip of paper, a word being printed at one stroke in plain English letters. An ordinary typewriter is handicapped in the matter of speed by the fact that only one key can be struck and only one finger used at a time—nine fingers being always idle. By this invention, the keyboard is so constructed that all the keys can be operated simultaneously. The machine has only sixteen printing keys, arranged in pairs, so that each finger can operate two; hence, sixteen characters can be printed at each stroke, if needed; and by the use of a pair of shift keys at each side of the keyboard, the capacity of each printing key is increased, just as the use of a shift key on the ordinary typewriter enables the operator to print either a small letter or a capital by using or not using the shift. On the Anderson machine, however, the shift keys and the printing keys are struck together and the hands remain substantially in one position, simply moving up and down, each finger above the pair of keys assigned to it, instead of darting here and there over a large keyboard. The illustration shows an operator in the act of printing the word "mankind." One downward movement of the hands prints the word, and as soon as they are lifted the machine automatically shifts the paper forward ready for the next word. It is claimed that this machine can be operated at a speed of 100 words a minute after six weeks' practice, and that its possibilities in the way of speed are greater than those of stenography; that it will not only save the time now spent in learning shorthand, but will do away with errors and illegible notes, and that in courts and large mercantile establishments a corps of typewriter copyists can be kept busy transcribing while a single Anderson operator is "taking." This typewriter is now in practical use in several large mercantile establishments, and operators are regularly being taught to work with its assistance instead of learning the more complicated systems of shorthand reporting.



THE ANDERSON TYPEWRITER.

A NOVEL MUSIC LEAF TURNER.

A device designed to facilitate the turning of leaves of music, obviating the annoying delays so frequently embarrassing to a performer, is shown in the accompanying illustration, a rear view being given as indicating the manner of connecting the operating levers with the leaf-turning mechanism. The improvement has



FLETCHER'S MUSIC LEAF TURNER.

been patented by James Fletcher, of Chauncey, Westchester County, N. Y. To bring the upper edge of the music always in the same relative position to the leaf-turning mechanism, the top portion of the stand is made adjustable by thumbscrews, and in the top edge is a central pivot carrying rollers, from which extend horizontal leaf-carrying arms, provided with clamps or other devices for engaging the sheets of music. On another pivot, on the rear side of the music holder, are rollers, connected by cords with the rollers carrying the horizontal arms, and to these cords are connected two sets of pivoted operating levers, the different sets being connected to opposite sides or runs of the cords. These levers are connected by other cords to pivoted bell crank levers carrying keys in convenient reach of the player. A rigid arm projects from the music holder at one side, beneath which the thumb may be placed as the finger engages a key lever, to facilitate operating the device by pressing the thumb and finger together, thus obviating any tendency to shake or move the holder. By reason of the connection of the levers with both sides of the cords, it is obvious that the leaves may be turned in either direction, one or more pages being turned at once if desired. The keys may be placed at either side, or, by a slightly altered arrangement, on both sides, and, as the harder parts of the mechanism do not strike each other, the device is designed to be practically noiseless.

A STEEL manufactory at Meurthe-et-Moselle recently blew out one of its furnaces which had remained in blast for seventeen years, in order to rebuild it to a height of seventy-five feet.

Shoe Eyelets.

There are many things that are sold by the gross, and not a few that are sold by the thousand, but there are not many that are sold by the million. Among the things that are so sold, however, are shoe eyelets, says the New York Sun.

Shoe eyelets are made of brass, by machines whose operation is almost entirely automatic. Three or four machines are required to produce the eyelet in the form in which it is sold, the brass being fed into the first machine in thin, flat strips. As sold to the shoe manufacturer, the eyelet is turned down at one end only. The eyelets look as much as anything like so many little hats with narrow brims and without any tops in the crowns. The upper end of the crown, which is like the end of a little cylinder, is put through the eyelet hole in the shoe, the finished brim or flange of the eyelet resting against the leather upon the outside. After the eyelet has thus been put in place its inner end is turned down upon the leather by a machine made for that purpose. In the manufacture of the eyelets a number of very slight vertical indentations are made at equal distances apart in the outside of the eyelet around the smooth, straight end. When the shoe machine smashes down the inner side of the eyelet the metal parts at these indentations are spread uniformly, thus giving it a secure hold.

Eyelets are made of various sizes in diameter and of various lengths of shank or cylinder, according to the thickness of the material with which they are to be used; and after they come from the machines they are finished in great variety. Some are finished white—these are silver plated; some are gilt finished and some are coppered. Eyelets are japanned in black or in various shades of russet; they are, in fact, made in any size and of any color that may be desired. Sooner or later the japanning wears off, exposing the brass. There are now made shoe eyelets that are covered with celluloid, which keep their color, but these are much more expensive than the kinds commonly used.

Shoe eyelets are packed in boxes containing 1,000, 10,000, 100,000, 250,000, and 500,000 each. Eyelets of the kinds most commonly used are sold, according to sizes and styles, at prices ranging from $60 to $135 a million. Some of the celluloid-covered eyelets sell for as much as $500 a million.

The sale of shoe eyelets depends, of course, somewhat upon the prevailing style of shoe. When button shoes are more generally worn, not so many shoe eyelets are sold, but the number sold is always very large.

Eyelets are made for a wide variety of uses, up to the great eyelets that are sewed into the corners of sails, through which the sail is lashed to the end of the boom or yard. Taking them all together, the number is enormous; of shoe eyelets alone there are sold in this country some thousands of millions annually.

Veils and Vision.

Dr. Casey A. Wood, an American specialist, says that it is within the experience of every ophthalmologist that the wearing of veils produces weak eyesight, headaches, and sometimes vertigo and nausea. Not only are these effects produced by the eye strain consequent upon the increased efforts made by one or both eyes to see through or around an obstruction, but the irregular figuring on the veil itself is in some instances an annoyance to the wearer. Dr. Wood had a dozen typical specimens of veils selected for him, and made a number of experiments with them to determine the extent to which veils of various kinds affected the eyesight. He sums up his results as follows: 1. Every description of veil affects more or less the ability to see distinctly, both at a distance and near at hand. 2. The most objectionable kind is the dotted veil, although the influence for evil of this variety is more marked in some samples than in others. 3. Other things being equal, in undotted and non-figured veils vision is interfered with in direct proportion to the number of meshes to the square inch. 4. The texture of the veil plays an important part in the amount and kind of eye strain produced by the veil. When the sides of the mesh are single compact threads, the eye is embarrassed very much less in its effort to distinguish objects than when double threads are employed. 5. The least objectionable veil is that without dots, sprays, or other figures, but with large, regular meshes made with single compact threads.

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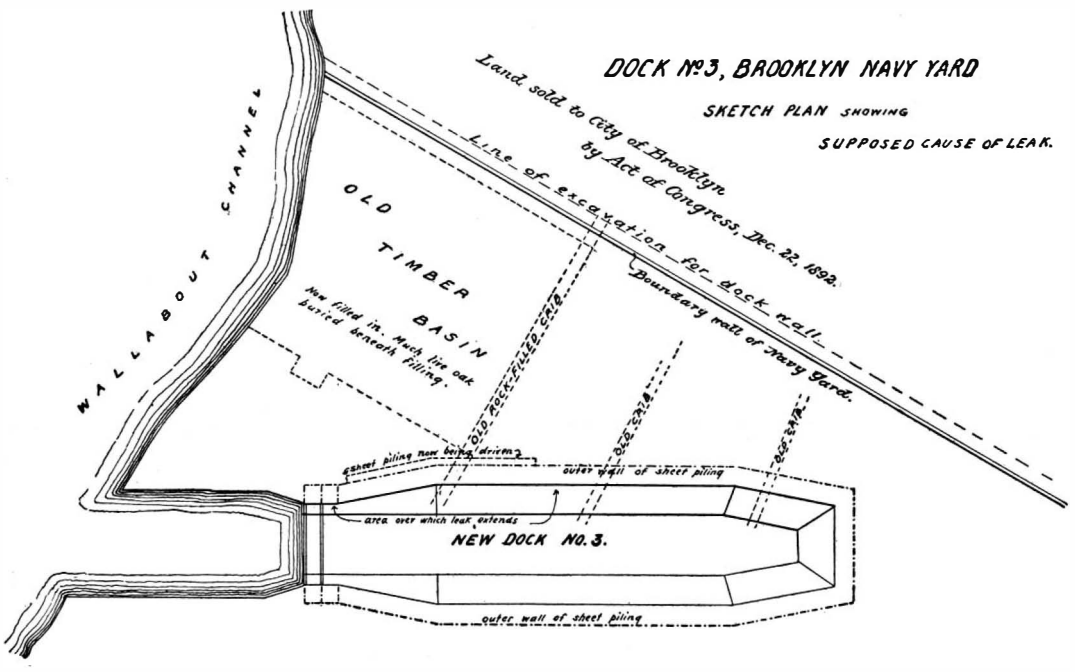
THE LEAK IN THE NEW DRY DOCK, BROOKLYN NAVY YARD.

The large dry dock at the Brooklyn navy yard, known as No. 3, which was completed early in the present year, has developed a leak which is so serious as to necessitate the temporary closing of the dock while measures are being taken to locate and remedy the defect.

The leak first showed itself when the Massachusetts was in the dock, the water coming in at the joints of the side altars or steps. The flow increased so rapidly that the work on the ship was hastened, and water was let into the dock as early as possible. The area over which the water comes in is quite extensive. It commences at a point about 40 feet from the caisson and extends for 250 feet on the north side, all the altar joints leaking from the 26 foot level to the bottom of the dock. The inflow of water is largest near the caisson and at a point where the old timber and stone bulkhead of a former dock line was dredged out during the excavation of the dry dock. It is naturally supposed that the water is working its way in behind the walls of the dock by way of this buried bulkhead.

If our readers refer to the SCIENTIFIC AMERICAN of February 20, they will find a full description of this dry dock, in which the means adopted for preventing seepage of the water through the sides of the dock are explained at full length. In addition to the puddled clay which was worked in immediately behind the altars, a complete wall of sheet piling, as shown in the accompanying sketch, was driven around the dock, completely encircling the sides and inner end. The sheet piles were tongued and grooved, and were driven to the depth of 45 feet, wherever it was practicable. If this wall had been everywhere driven down to hard material, and if the joints had been compactly made, it would be impossible for the amount of water that is entering the dock to pass through. The present heavy leakage makes it almost certain that the wall is defective.

The site upon which the dock is built was originally a swampy piece of ground, which from time immemorial had been used as the general dumping ground of the navy yard. There is reason to believe that three successive crib bulkheads had been built across it parallel with the river front, and the space behind them filled in with miscellaneous material. The ground thus made extended from midway between dock No. 2 and the present dock out in a northerly direction for several hundred yards; and it will thus be seen that the new dock was excavated partly from made ground and partly from the original bottom of the swamp. The axis of the dock lies approximately at right angles to the line of the old bulkheads.


DOCK No. 3, BROOKLYN NAVY YARD
SKETCH PLAN SHOWING
SUPPOSED CAUSE OF LEAK.
Land sold to City of Brooklyn by Act of Congress, Dec. 22, 1892.
Line of excavation for dock wall.
Boundary wall of navy yard.
WALLABOUT CHANNEL
OLD TIMBER BASIN
Now filled in. Much live oak buried beneath filling.
OLD ROCK-FILLED CRIB
OLD CRIB
OLD CRIB
cement piling now being driven
outer wall of sheet piling
area over which leak extends
NEW DOCK No. 3.
outer wall of sheet piling

SKETCH PLAN SHOWING SITE OF DOCK No. 3, BROOKLYN NAVY YARD.

The timber and the rock filling of these structures was unearthed by the contractors during the course of the excavation and as much of them as intersected the dock was removed. The outer wall of sheet piling on the north side would naturally intersect the bulkheads, and it is feared that the rocks and timber of which they are built form a break in the continuity of the piling. This does not seem to have affected the dock during the two or three months during which it has been open; but recently dredging operations have been carried on by the city at the northern side of the made ground, where excavation for concrete bulkhead walls is now being carried on. The leak appeared when the dredge was working on the line of the old bulkhead above mentioned, and it is naturally supposed that as the wall of mud was removed the water flowed through the rock filling of the crib, passed through the wall of sheet piling and accumulated behind the altars of the new dock. By reference to the accompanying sketch it will be seen that the southeast corner of the old timber basin abuts on the wall of sheet piling in close proximity to the present leak. This basin is full of live oak timber which lay there in the days of wooden shipbuilding and was never removed when the basin was filled up. It is quite possible that the water also finds its way from the Wallabout Channel through this timber to the weak spot in the sheet piling.

The authorities are endeavoring to stop the leak by driving a second wall of sheet piling ten feet back from the old wall for a distance of two hundred and fifty feet. The new work will be closed by cross walls which will be driven to a watertight connection with the old structure. This will form a kind of three-sided box which will inclose the faulty portion of the work.

It takes no expert to understand that this line of buried cribwork, leading directly up to the dock, is a serious menace to its safety. As long as it lies there it will act as an underground conduit for the water, which might flow in considerable volume through the rock with which the crib is filled. It would surely be good economy to remove these cribs bodily for some distance back from the dock and replace them with more impervious material.

It will be understood that the above statement of the case is based upon the ascertainable facts at the time of our going to press. A special board is now making a thorough investigation of both this dock and dock No. 2, which shows indications of a slight leak on the northern side. We shall hope to give the findings of this board in an early issue.

False Stimulation of Invention.

To stimulate invention the United States government has enacted that every inventor of a new and useful machine, tool, utensil, article of manufacture, composition of matter or any improvement thereon, shall have the exclusive right to make, use and sell the invention for a period of seventeen years. This stimulation has been quite sufficient, for, under its influence, as has been stated, more patents have been granted in the United States than in all the world besides. But recently there has been introduced an additional stimulation in the shape of false statements and deceitful promises about the great fortunes to be made in patents, the result of which is turning the light heads of hundreds of thousands of bread winning dunces from normal toil to illusion, with its direful sequence of ruin and want. It is an actual fact that thousands of men and women are selling farms, horses, cows, and economizing in clothes and shoes for themselves and children because they have been persuaded that a fortune awaits them in a patent for a churn, a washing machine, a kitchen cabinet, a car coupler, nut lock, or in some other of the hundreds of classes of overstocked invention. Many patent attorneys, so called, are flooding the country with "lists of inventions wanted." The inventions are, of course, not wanted. There are, dead in the Patent Office, hundreds of patents in the same class, and these stimulating, seductive statements are really and only in the interest of the alleged patent attorneys who send them.

The average inventor is credulous. Some, having been taught in the school of experience, are wary, but many even of these have fallen prey to the bold and brilliant talent that has recently appeared in the field. They have been plied with such seductive "literature" and lured by such caressing promises of sale of invention and a fortune only waiting to be grasped that they have overcome their caution and silenced their common sense to find themselves sans money, sans patent, sans sale, and rich only in fresh experience and the chagrin which rough teaching brings.

It is far from desirable that real, genuine, progressive invention should be discouraged or checked, but it is desirable and imperious that the mendacities of patent attorneys shall be stopped, because they are the source of most of that which is spurious and sloppy in the Patent Office, to say nothing of the ruin and misery of thousands of people fitted only for honest toil. Not half the patents would be applied for if the alleged inventor was reliably advised as to the state of the art, or told that his device was not patentable. The facts are withheld from him until the attorney has pocketed his fee, and he is not only kept ignorant of the truth, but is cunningly plied with assurances of the great merit of his invention, the promise of its ready sale, with an offer to advertise it for consideration, or with a medal alleged to come from a "board of awards," as a certificate of excellence, etc. By these means he is adroitly lured and robbed, not by the bold "stand and deliver" method of old, but by the cowardly and degenerate methods of educated, refined, brilliant and lawyerlike rascality, using the press of the United States for a shingle and the United States mails for tentacles.—Media, Pa., Ledger, May 6, 1897.

The Universal Postage Stamp.

One subject which is sure to be brought prominently before the International Postal Congress is the universal postage stamp. For many years all those who are engaged in any business which requires a large foreign correspondence have been greatly annoyed by the difficulties connected with forwarding postage to foreign countries. Very often their inquiries are of a personal nature, so that they desire to send necessary postage for the return letter from their correspondent. One way of getting over the difficulty is to purchase English or French stamps from dealers, but the use of such stamps is limited. The other alternative is to have correspondents send their letters without stamping them, but this is expensive, as double the regular rate of postage is charged for unpaid letters. On the other hand, American business houses receive numerous communications from all over the world which require an answer, and as these letters are often of a personal nature, the postage is burdensome. For a long time business houses have desired a stamp that could be bought anywhere for its face value and which could be sent to any part of the world with the assurance that it would prepay a letter to the sender.

The subject of international postage stamps has been brought up at former congresses, but objections have been always formulated against them. Our government has also been reluctant to let a universal stamp be adopted, in view of the revenue which would be lost. It is not likely that those of the present congress who represent the American postal authorities will stand in the way of an international stamp.

Another question not directly related to the International Postal Congress is that the stamps of all countries should have a standard color for stamps of approximately the same denomination. The value of such a system is obvious; the clerks would know from the color of the stamp just what has been paid and whether the sum was correct. Our own postal department has been a flagrant sinner in respect to the change of colors in stamps. It is to be hoped that, notwithstanding the conflicting interests of so many countries which are involved, the matter of the international stamp and the uniform color will be adjusted at the present congress.

Rock Pictures in Oregon.

W. B. Whittemore, while in Alturas, Oregon, recently, discovered some remarkable hieroglyphics about fifteen miles northeast from the north end of Warner valley, on the edge of what is locally known as the "desert" in Lake County, says the San Francisco Call. Mr. Whittemore says the hieroglyphics had been cut with a sharp instrument in the surface of the hard basaltic rock. They cover the face of the bluff for a distance of about three miles, and consist of pictures of Indians with bows, arrows, and spears, besides deer, antelope, dogs, and wolves, geese, ducks, swans, and reptiles of various kinds. Intermingled with these animals are characters which, of course, he could not decipher. He says that the execution of the pictures was very good, and he is satisfied that it could not have been the work of ordinary Indians. Throughout the entire distance the characters and pictures are in rows.

The Indians of the vicinity have no knowledge of the meaning of the hieroglyphics or of the people who ages ago chiseled them on the surface of the rocks. From the description given, the picture writing bears a close resemblance to that found in Mexico and Central America. If this supposition is true, a careful study might reveal to the archæologist some insight into the origin or wanderings of a dead and forgotten civilization.

Largest Paper Machine in the World.

At Rumford Falls, Me., the largest paper machine in the world is now in the course of construction by the Rumford Falls Paper Company. It will produce paper 150 inches in width, which is said to be 15 inches wider than any American machine and 2 inches wider than any other machine in the world. It was built at Worcester, Mass., and its estimated weight is 1,200,000 pounds. It is to deliver a web of paper 150 inches wide, at the rate of 500 feet per minute, or, in a complete day's run of 24 hours, will turn out about 9,000,000 square feet, equivalent to 35 tons. A force of between 40 and 50 men will be required to maintain and supply it with stock, etc.

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The Development of Kinetograph Films.

Mr. Edmund A. Robins, in the Photogram, says the development of ribbon films is very difficult and uncertain without special appliances to deal with the 40 and 50 foot lengths in general use, and which require very careful manipulation to obtain uniform density and freedom from veiling. The first method was to have two large and deep dishes containing the developer, and the film, being first soaked in water, was passed from one to the other alternately. This was very crude, and the films were easily damaged. The next method was to wind the film on a square frame of paraffined wood or plated metal, the development taking place in a deep dish, and the film left on the frame during the whole of the operations. This is still in use, and gives very good results. The ideal method is to wind the film upon a drum which is capable of rotation in the developer. The system devised and used by Mr. T. H. Blair, and which I give with his permission, is one of the best. A glass drum is suspended in such a manner that it can be raised or lowered vertically, and is capable of rotation upon a horizontal axis. The film is wound spirally upon this, the ends being fastened by clips, and the whole lowered into a trough of enameled iron, shaped to the glass drum. The developer is first placed in the trough to the depth of one inch, and surrounding about one-third of the drum when in place. The drum is rotated, and a camel's hair brush passed over the film to remove air bubbles. To facilitate examination, an incandescent electric lamp covered with ruby fabric can be placed inside the drum, the wires being brought out through the axle, which is hollow. When development is complete, the film is washed by a spray from above, and then passed on to another drum similarly arranged and fixed. The hypo should be about 4 oz. to the pint. Still another drum is used for washing; and these two latter may be made, together with their troughs, of wood well covered with paraffin wax. Each drum is made slightly larger than the first, the film is wound from one to the other by rotating the larger drum, the film being used as a driving belt, and the difference in diameter keeping the adjacent coils from overlapping. The washing is performed by a spray from above, the drum being rotated meanwhile, and twenty minutes' washing being sufficient. The films should be glycerined to prevent the gelatine drying too hard and horny. A 4 per cent solution is recommended, and it should not be left too long in contact, else the film will take up too much and dry "tacky." The European Blair Camera Company recommend the following formula for their negative film, and it is found to answer well with the Eastman film:

Metol	50 grains	3·25 grammes
Hydrokinone	50 grains	3·25 grammes
Sodium sulphite	1½ oz.	42·5 grammes
Sodium carbonate	1 oz.	28·5 grammes
Potass. bromide	20 grains	1·25 grammes
Water	30 oz.	850 c. c.

The metol should be dissolved before the sulphite is added. This gives excellent results, and is very quick. If too energetic, it may be diluted. Another formula which is recommended for the positive chloride film of the Blair Company is as follows:

A.—Hydrokinone	15 grains	1 gramme
Sodium sulphite	75 grains	5 grammes
Water	5 oz.	142 c. c.
B.—Potassium carbonate	90 grains	6 grammes
Water	5 oz.	142 c. c.
C.—Potassium bromide	1 oz.	28·5 grammes
Water	10 oz.	285 c. c.

Equal quantities each of A and B and a few minims of C.

The former formula is not suitable for the positive film, which should be fully exposed, and the development not too protracted, else the high lights are in danger of being veiled. This film is coated on transparent celluloid, gives brown tones with the above developer, and is slow, about the same as a slow lantern plate. Pyro cannot be used for developing these films, as it is oxidized far too rapidly, and is very liable to stain. As the above-mentioned developers may be used again and again, if kept well stoppered when not in use, a great saving is obtained by using them, especially as large quantities are required.

MENDING KINETOGRAMS.

A note on the joining of films may be useful, as it is generally convenient to have the films in one continuous length for development, and also to mend tears. The solvent generally used is acetone. Amyl acetate is also used, but cannot be compared to acetone for effectiveness. To join two pieces of film, the edges must be well scraped free from gelatine and grease for about a quarter of an inch. The edges are then placed over one another in the proper position and acetone placed between by means of a camel hair brush, and the two edges firmly pressed together between glass until set. Care must be taken not to use too much acetone, or the joint will be weakened by the solvent action of the acetone. Splits at the edges of films are mended by cementing a thin strip of scraped celluloid over the tear and firmly pressing. If any of the holes become torn out, others can be placed in the proper position and cemented, the new holes being cut from another similar film, and care being taken that they are kept in proper register.

Recent Patent and Trademark Decisions.

Schenck v. Singer Manufacturing Company (U. S. C. C. A., 2d Cir.), 77 Fed., 841.

Band Wheel Bearing for Sewing Machines.—The Miller and Diehl patent, No. 224,710, has been held valid as to claims 1 and 2, notwithstanding the apparently simple character of the change made, in view of the beneficial results achieved and the obvious defects of construction which had for many years baffled other inventors and mechanics.

Cohler v. George Worthington Company (U. S. C. C., Ohio), 77 Fed., 844.

Presumption of Non-Infringement.—The granting of a subsequent patent raises a presumption that the device therein does not infringe a prior patent.

N. K. Fairbanks Company v. R. W. Bell Manufacturing Company (U. S. C. C. A., 2d Cir.), 77 Fed., 869.

Unfair Competition in Trade by Simulation of Packages.—The likelihood of deception of an ordinary purchaser exercising ordinary care is the test applied to alleged infringement of trademarks, but regard must be had to the class of persons who purchase the article for consumption and also to the circumstances ordinarily attending their purchase. In determining whether packages are so dressed up as to deceive purchasers, we should regard rather the effect on the consumer than upon the jobber. In such cases the danger of deception rather than the intent governs the court. In this case the complainant began manufacturing soap powder that was yellow and placed it in a yellow wrapper bearing the words "Gold Dust" and "Washing Powder." After two or three years of sale and expenditure of considerable money in advertising, defendant, who had been selling washing powders in small red packages, began making a yellow powder called "Buffalo Powder," put up in packages of the same size and with a yellow wrapper of the same shade as complainant's. There were numerous other particulars wherein the two packages resembled. The court enjoined the defendant from selling that particular form of package or any other form which should as closely resemble complainant's packages, but the defendant could sell packages of the powder that were unlike complainant's in appearance.

Philadelphia Creamery Supply Company v. Davis & Rankin Building and Manufacturing Company (U. S. C. C., Ill.), 77 Fed., 879.

Agreement Not to Deny the Validity of a Patent.—An agreement in a license that the licensee will not directly or indirectly question the validity of the patent is not void as against public policy, and it will estop the corporation formed and controlled by the licensees as effectually as the licensees themselves.

Cerealine Manufacturing Company v. Bates (U. S. C. C., Ind.), 77 Fed., 883.

Broadening a Claim by Disclaimer.—An element of a combination claimed cannot be eliminated by disclaimer, as that tends to broaden the claim and make it rest on other elements than those on which it was predicated when issued.

Rogers v. Fitch (U. S. C. C., N. Y.), 77 Fed., 885.

Mattresses.—The Fulton patent, No. 322,326, for a mattress, the lower portion of which is sunk below the bed rails, has been held valid.

Foreign Art.—Patents relating to car seats cannot be cited against or as anticipating a patent for a mattress.

William Schwarzwaelder Company v. Detroit (U. S. C. C., Mich.), 77 Fed., 886.

Evidence of Joint Invention.—Where a patent has been issued to one person and another claims to be a joint inventor with him, the patent is prima facie evidence in favor of the patentee, so that if the only other evidence consists of the party claiming joint inventorship and the patentee denying it, the patent will be held to have been properly issued.

What Amounts to Invention.—Producing a cheaper and more durable folding chair than any before does not amount to invention, where all the parts have been taken from prior constructions and each part does the same work in the same way as before. And the fact that the improved device meets with a ready sale and has largely superseded other constructions does not establish novelty or invention, excepting when the question is otherwise in doubt.

Folding Chairs.—The Chichester patent, No. 328,838, has been declared void.

Williams v. McNeely (U. S. C. C., Pa.), 77 Fed., 894.

Damages for Infringement.—Where the complainant sued on only part of the claims of a patent and it lies solely on an established license fee of the whole patent as the measure of damages, he can recover only a nominal sum where his evidence fails to apportion with reasonable certainty the amount of such fee between the claims in litigation and those not.

Rousseau v. Peck (U. S. C. C. A., 2d Cir.), 78 Fed., 113.

Electric Circuit Breakers.—The Rousseau patent, No. 279,107, for an automatic electric circuit opener or cut-off, used chiefly to light gas jets, has been construed to be of a secondary character and, therefore, limited.

Science Notes.

Furbringer's statistics for the antitoxin treatment during 1896 show 663 cases, with 114 deaths, or a mortality of 17 per cent. In the year preceding there had been 581 cases in the hospital, half of which only were subjected to the serum treatment, and the mortality had been over 30 per cent. Only one accident resulted from the injections. In a child of seven years, syncope lasting two minutes followed what was supposed to have been an injection into a vein. By the employment of violent revulsive agents, the child was brought back to life.

With a view to rendering the common use of acetylene less dangerous, Messrs. Claude and Hess have proposed to store it in solution. The solvent chosen is acetone, which is capable at atmospheric pressure and at 60 degrees Fah. of dissolving 25 times its volume of the gas, while at a pressure of 12 atmospheres it can hold no less than 300 times its volume in solution. Thus one pound weight of acetone is capable of storing practically the whole gas which can be generated from one pound of calcium carbide. The solubility of acetylene in acetone is only about half as much at a temperature of 120 degrees as it is at 60 degrees Fah.

Reports are being frequently published both in the public and medical press relating to burnings by the X rays. The injuries caused by the experiments in taking Roentgen photographs are now attracting the serious attention of physicians and physicists. For example a young woman was photographed who had suffered from hip disease. A few days later she began to feel a numbness and have pains in the hip. She grew worse rapidly, and several operations were performed, the flesh around the sores being cut away, but at last accounts there was no sign of healing, and her condition is now critical. A skin grafting operation will probably be attempted.

The college of agriculture of Cornell University has undertaken to assist, free of expense, all teachers, presumably in New York State, who wish to introduce what is known as "nature study" into their schools. Nature study or seeing familiar things in a new light is now recognized to be a valuable factor in education. The world is full of common things about which people do not inquire; for example, how many people can explain, so that a child can understand it, why water puts out a fire, or whence all the house flies come? Yet such subjects can be made very interesting to children, and they can be taken up in schools, not as an added recitation, but as a rest exercise; once or twice a week to relieve the monotony of the school room, and later be made the theme for a language exercise. Here are two important faculties which may be brought into exercise—observation and the power of expressing definitely what is seen.

A brief description appears in Nature of Pauling's new and novel method of drawing relief maps, which is pronounced a great advance on any system now in use, both in respect of accuracy and ease of execution. The map is said to be, in effect, a closely contoured map, printed on silver gray paper, the contour lines being white where illuminated by a source of light supposed to be 45 degrees above the western horizon, and black elsewhere. Level plateaus and slightly sloping areas are thus represented by the natural gray color of the paper, steep declivities toward the west being lightened by the closely drawn white lines, and toward the east correspondingly darkened by the black lines, the departure from the normal gray showing more the closer the lines, that is, the steeper the slope. Thus, the Pauling method has the merit of giving a clear idea of steepness derived from the contour lines themselves, and the additional advantage is presented of avoiding the confusion produced by the shadows in some modern maps, where the illumination is supposed to come from the horizon.

Prof. Lannelongue, a distinguished French surgeon, recently gave at the Academy of Sciences of Paris an interesting account of a phenomenon he had recently witnessed. He said that a number of children were playing in a courtyard in the shadow of a wall, the top of which was under strong sunlight. Suddenly several of the children began to act in a most peculiar manner, dancing around, each with his hand on his head, and crying out: "My head burns." Prof. Lannelongue examined the heads of the children and found blisters on their scalps. In trying to account to himself for the phenomenon he wondered if the blisters had been produced by X rays projected from the top of the wall. He instituted in his laboratory a series of experiments upon several persons. Some of these when exposed to the action of the rays were protected by strontium glass. These were not affected, but the other persons experimented upon who were not similarly protected were burned as the children had been. Prof. Lannelongue declares that he believed that X rays discoveries would cause a change to be made in the whole treatment of sunstroke. He added that the ancient Greeks were no fools when they covered their heads with brass helmets and their chests and backs with light metal cuirasses, which were impervious to X rays. Perhaps an anti-sunstroke helmet, he concluded, would be made in the future of strontium glass.

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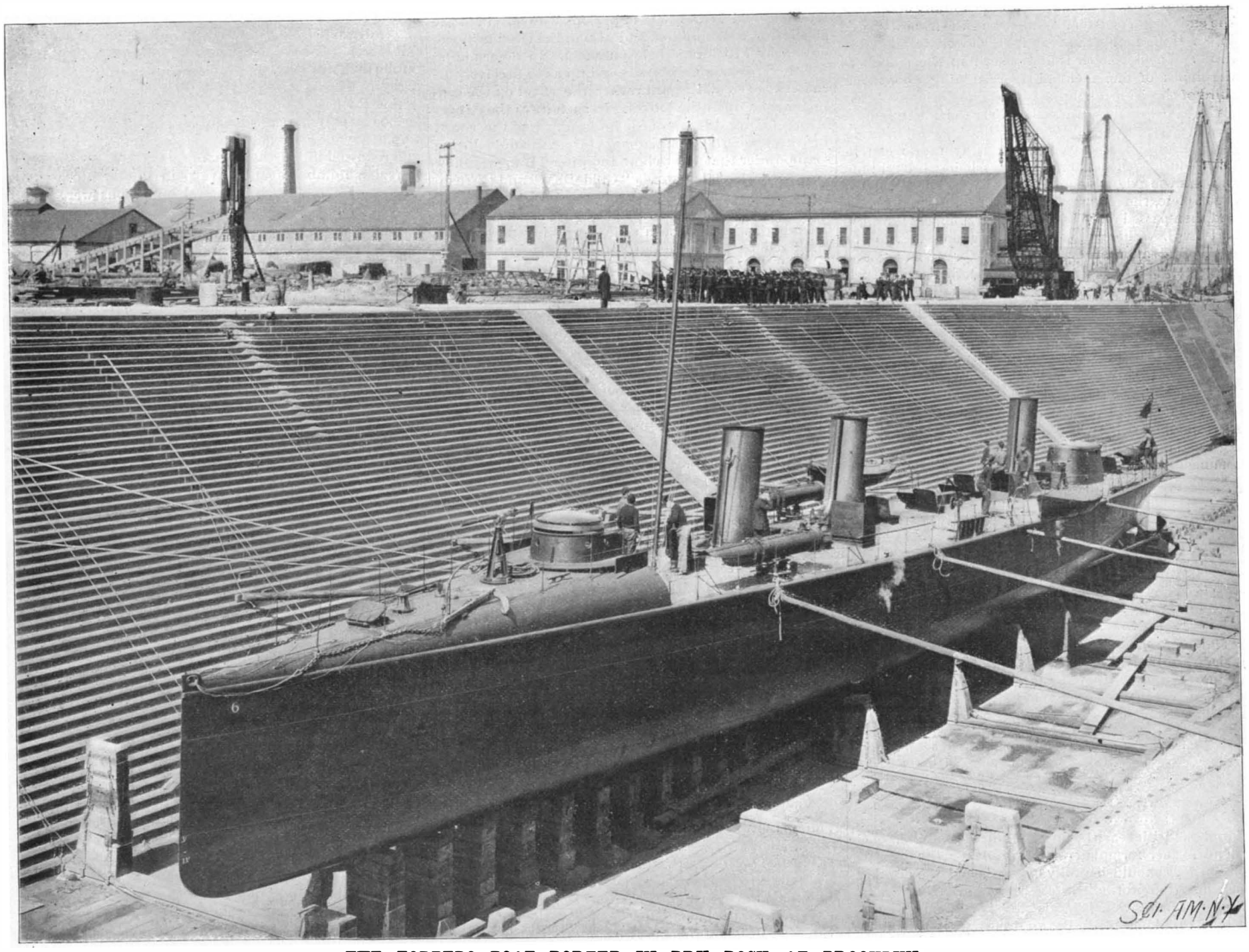
THE TORPEDO BOAT PORTER.

Torpedo boat construction has exercised a powerful influence upon the art of steamship building, particularly in the direction of reducing the weight and improving the quality of the materials of construction and in producing improved designs of engines and boilers. Torpedo boat builders were among the first to make use of high piston speed, and they have contributed more than any other class of engineers to the development of the water tube boiler. In our issue of March 6 we gave an illustration of the torpedo boat Porter, then known as No. 6, which was reproduced from a photograph taken when she was running at full speed; and the accompanying illustration, showing the little craft in dry dock, No. 2, at the Brooklyn navy yard, will give the reader some idea of the beautiful lines upon which the hull of this fleet vessel is modeled. It will be noticed that the water line shows a draft of about four feet at the bow, but when the boat is being driven at its full speed of nearly 29 knots an hour, it settles at the stern and lifts its forefoot clear of the water to such an extent that five or six feet of the keel is visible. This is a common occurrence when the smaller class of light draft torpedo boat destroyers and pleasure yachts are driven at speeds in the neighborhood of 30 knots an hour.

Owing to the altitude from which the photograph was taken, we get an excellent idea of the arrangement of the deck. It will be noticed that a turtle back deck extends from the bow aft as far as the rear of the forward conning tower. This is intended to give the boat increased buoyancy when she is running against a head sea. Just forward of the conning tower is a one-pounder rapid fire gun on a tripod mount. Two other one-pounder guns on similar mounts are located on either beam on the after part of the deck. The long cylindrical object seen on the port side of the boat in front of the forward funnel is a torpedo launching tube. There is another one amidships on the starboard side, and a third tube is located at the stern on the center line. The launching tube is nothing more nor less than a gun, of which the torpedo is the projectile. The latter, loaded with its charge of explosive, and with its air reservoir charged with compressed air, is thrust into the gun, or tube, at the breech; the breech block is then closed and the torpedo is ejected by firing a small charge of powder or releasing a charge of compressed air. The launching tube is carried upon a central pivot mount, and may be elevated or depressed in the same way as an ordinary gun. In making an attack, the torpedo boat would charge upon the ship at full speed, and when she was within torpedo range she would swing round to port or starboard so as to bring her launching tubes to bear. If the bow torpedo or that amidships failed to reach the mark, she would have another chance with the tube that is located at her stern.

As the Porter is built of the very thinnest kind of plating, she would be penetrable by the smallest rapid fire guns of the enemy, and the mad charge through the hail of bullets and shells that would be rained upon her would evidently be somewhat of the nature of a forlorn hope. However, it is not likely that torpedo boat attack will often be carried out in broad daylight. The best work of these little boats will be done on dark nights and in foggy weather; and even if they never strike a blow, the moral effect which they will exercise upon the enemy will be well worth the cost of their construction and maintenance.



THE TORPEDO BOAT PORTER IN DRY DOCK AT BROOKLYN.

Solution for Chromatizing Dry Plates for Red.

By treating alizarin blue with bisulphite of soda a salt is formed which is very soluble in water and crystallizes in brown needles. On adding ammonia to the solution, the latter changes from brown to a greenish-blue color. This, however, cannot be kept for longer than a day. To sensitize plates, they are plunged into the following solution for three minutes:

Solution of bisulphite of alizarin blue of a strength 1 in 500	20 minims
Ammonia	5 minims
Water	1 ounce

Then allow them to dry.

These plates are extremely sensitive to the radiations comprised between C and A, with a maximum between B and C and a minimum toward A of the spectrum. By prolonging the exposure, the action extends toward the ultra-red. From the blue, where the action is very energetic, the sensibility diminishes, at first slightly, just toward E, then very rapidly to a minimum near D; but the general sensitiveness of the plate is slightly diminished. The presence of a little nitrate of silver in the solution increases the sensitiveness and extends it just up to the infra-red. To produce this effect 30 to 50 minims of a solution of nitrate of silver (1 in 40) are added to the bath given above.

To make the alizarin salt, mix the commercial paste containing 12 per cent of dry alizarin blue with 35 per cent of a solution of bisulphite of soda of 30° Be. Allow to macerate for ten or fifteen hours, and filter off the blue that remains unacted upon, which can be used for a future operation. The solution is now ready for use.—Trans. C. F. T., from Moniteur de la Photographie for the Photogram.

Removing Paint by the Sand Blast.

Removing old paint from metal surfaces in structural steel and iron work—bridges, for example, and the like—previous to repainting, involves an expenditure of time and money quite beyond the conception of anyone who has never given the matter serious consideration, says Kuhlow's German Trade Review. Whether the sand blast, which is so efficient is cleaning castings, would perform satisfactorily in this direction is, therefore, a question of considerable economic interest. Whatever experiment has thus far been made has shown what was to be expected, that when the paint is reasonably new and the oil is in a slightly elastic state, it is exceedingly difficult to remove it by sand blast, though later, when the oil has become more oxidized from longer exposure to the air, it yields more readily to the attack of the process. Paint, therefore, which is old enough to warrant its removal and replacing by a fresh coat would probably give way before the sand grains in an encouraging manner. In one instance the sand blast was used to clean between decks of a cattle steamer, which was in an exceedingly bad condition, with many coats of old paint on the ironwork. The results were highly satisfactory as to the quality of work done, but the time consumed was excessive. The air pressure used was, however, only about ten pounds per square inch, and it is, therefore, reasonable to suppose that if, say, from forty to fifty pounds pressure had been used, the results might have been satisfactory in point of both quality and economy of work. At any rate, it would seem worth trying the process further. The promise of money saving that it holds out is certainly seductive.

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HARVARD OBSERVATORY IN PERU.

BY S. I. BAILEY.*

The first ascents of El Misti were probably made before the arrival of the Spanish, and are beyond the reach of history and even tradition. But remains of walls and fires within the crater, mentioned in the earliest ascents of which we have any record, seem to refer to some custom or rites, of which little or nothing is known at the present day. In the opinion of many, the relics found point to former sacrificial pagan rites celebrated there, but similar relics, together with remains of human bones, found at other great heights, have been thought by others to indicate a custom among the ancient Indians of burying their dead, presumably their chiefs, at great elevations. The subject is certainly an interesting one. The facts in regard to El Misti are brought out by the testimony of various persons. First, by Padre Alvaro Melendez, in 1677, who discovered within the crater vestiges of a small stone structure, evidently the work of human hands. Their existence was verified two centuries later by the late Señor Juan de Romana, and recently by myself.

In 1784, probably, was undertaken the expedition by Bishop Miguel Gonzalez de Pamplona. Although the bishop himself did not succeed in reaching the summit, his followers succeeded in placing there the celebrated cross of iron, near the summit on the side toward Arequipa. This cross still stands in its original position, where it has withstood the storms and snows of more than a century. The bishop wished to celebrate mass at the summit, a ceremony which was destined to be postponed more than a century, when it was performed by the Rev. Jose I. Rivero, cura of Cayma. This was probably the most lofty place of religious service known in the history of the world.

An expedition made in 1787 by various persons from Chiguata is especially interesting from the descriptions and particularly from the drawings of the volcano which they made.

The path which I had constructed two years ago follows in part the route taken by this party. This is somewhat curious, as at that time I had not read the description of this expedition, which chose the northern side of the volcano, instead of the common route by the east. This party claim to have found a volcanic breathing hole, or vent, at an altitude of about 15,000 feet on the northern side. I see no good reason for doubting the correctness of this statement, although none of the members of the observatory, in the numerous visits to the summit, have ever seen the least activity on that side. The drawings which they made, although very exaggerated, are nevertheless fair representations of the craters and the volcano in general, as they would appear to an unscientific person to-day, and convince me that no radical changes have taken place within the last century. It may be interesting to note that, in spite of all that had been written on the subject, the well-known authority on Peru, Paz Soldan, who attempted the ascent in 1862, and failed, doubted whether any one had ever really reached the main summit.

CLOUD EFFECT—PICHU-PICHU IN DISTANCE.

In addition to its charm as a mountain and a volcano, however, to me the greatest attraction of El Misti lay in the site which it offered for the loftiest scientific station in the world. Splendidly isolated from the neighboring mountains, its summit, if it could be made accessible, was an ideal location for lofty meteorological studies.

The growing interest of meteorologists in the study of the upper air made the success of such an enterprise most desirable. Already in Europe and the United States lofty points had been utilized. In Europe various stations had been placed on mountains of different heights, in general under 10,000 feet. At this time, however, M. Janssen was attempting, what he since accomplished, the establishment of a station on the summit of Mont Blanc, at an elevation of 15,700 feet.

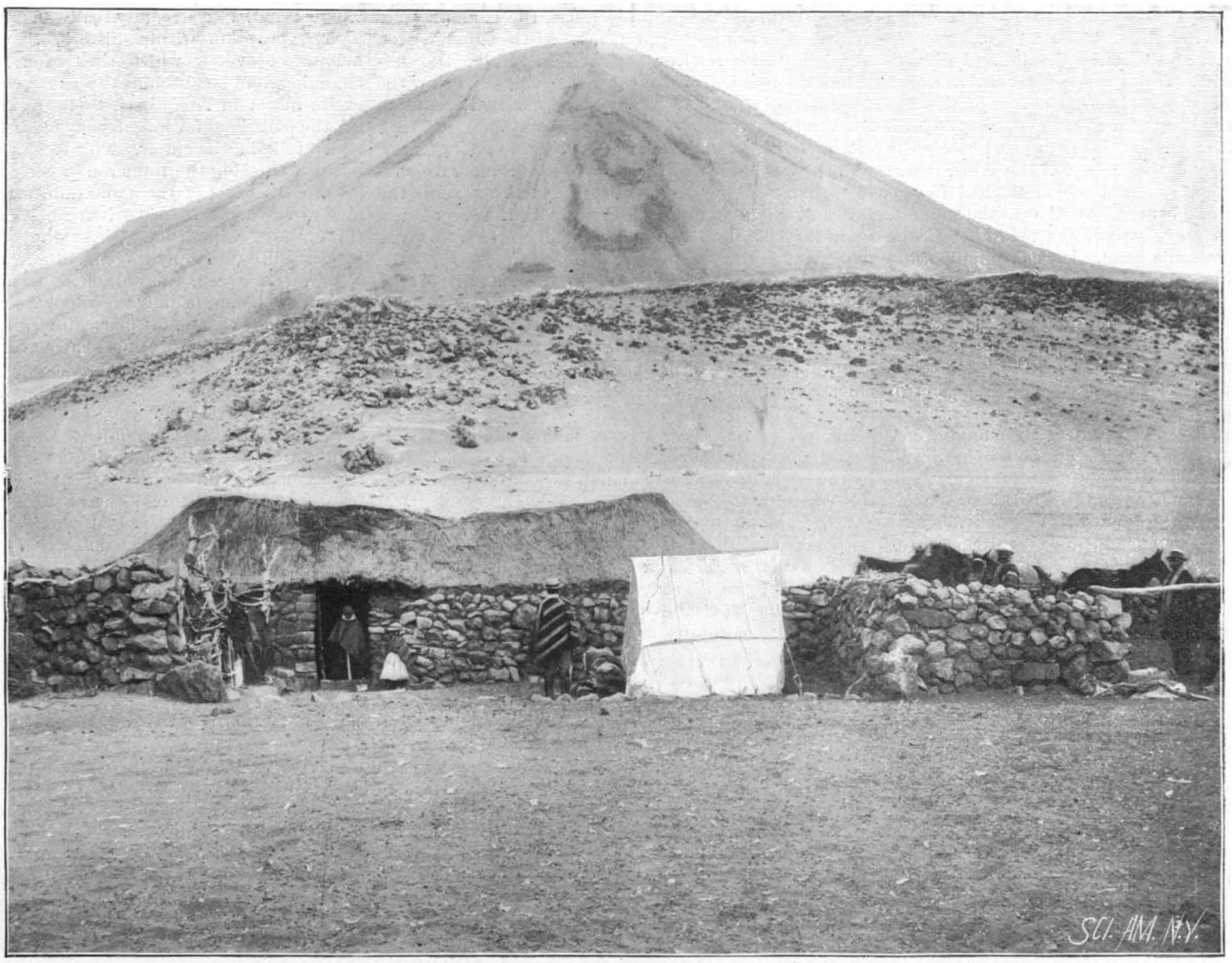
In the United States systematic observations had been carried on at an elevation of over 14,000 feet, on the summit of Pike's Peak.

El Misti stands alone. At first a sort of awe kept me from considering as possible the establishment of a station on its summit; but always, as I looked upon it, the impulse became stronger and stronger, and finally it could not be resisted.

Knowing from frequent experience in mountain climbing that mountain sickness would prevent success, unless the attempt was made with the greatest caution, I first planned an expedition entirely around the volcano, in order to examine all sides and choose that most easy of ascent. Accordingly, my brother, Mr. H. C. Bailey, and I, in August, 1893, passed entirely around the volcano, making photographs and examining its different faces with a powerful field glass.

On the east of the mountain lies the well known Alto de los Huesos. This is a broad, desert pampa, formed of volcanic materials, and overlain in certain parts with the bones of animals that have died from hunger and thirst. This lofty pampa forms the route for beasts of burden between Arequipa and the interior. It is a most cold and dreary region, without water and swept by strong winds. It rises to the height of more than 13,000 feet.

The ascent of the volcano has usually been attempted from this side, and a little wretched tambo



HALF-WAY HOUSE, ELEVATION 15,700 FEET, WITH VIEW OF EL MISTI.

* Lecture on El Misti delivered before the students of the University of Arequipa in Peru.

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there found has sheltered many persons with courageous hearts on their way to ascend the mountain, and many with sad hearts and sick bodies on their return. At least so said the old woman who kept the tambo.

The hut was of rough stone, with earth floor and grass roof. It boasted neither window, chair, nor bed. It was black with smoke and dirt. The only light at night came from a dismal little fire of twigs with which the woman attempted to cook a soup for the company. In answer to some inquiries she replied: "Yes, señor, I have lived here ever since the great earthquake. Ah! How many years that is! And during that time many, many people have come to the Misti. They have all come this way; many, many people, priests and Arequipanians, officials and foreigners, and most of all, foreigners, and some have reached the summit, and some have returned, so ill, ah! so ill; and some have died, and those who died [with a glance at us] were foreigners." She was informed that we were planning to build a path to the summit. She regarded me with pity, saying, "Impossible! impossible! Many, many many people have ascended the volcano, but always on foot. Where are there men enough to build the path, and food for them to eat, and money to pay them?" etc.

This kind of conversation by the witch of the mountain did not tend to make us more cheerful; nevertheless, at six o'clock the next morning we proceeded.

From this tambo the east summit of the volcano appears near and easy of access. Only those who have attempted it understand how difficult it is. The only possible entrance to the craters on this side is by the so-called "Portillo," or gate, which is a break in the old crater wall, allowing access to the "Callejon," or valley, which represents what is left of the old crater.

On this expedition we ascended the volcano to an altitude of 16,500 feet, and became convinced of the possibility of making a path and taking mules quite to the summit.

From about that elevation we saw a fine eruption of Ubinas, a volcano lying thirty miles to the east. At first the volcano was nearly clear from vapor or "smoke." All at once we saw a small black cloud rising from the mouth, which, within ten minutes, rose until its upper part was concealed by the clouds. But later it appeared far higher, through breaks in the clouds.

From what was known of the altitude of the volcano, I estimated that this dense cloud of volcanic sand rose at least 12,000 feet above the summit.

Seen from all sides, El Misti preserves its cone shape, but a careful examination showed that the northern side was more free from cliffs.

I shall not trouble you with the details and difficulties of the enterprise. A hut was constructed as a way station and base of supplies just at the foot of the central cone and at the head of a great cliff, at an elevation of about 15,700 feet. As this is approximately the altitude of Mont Blanc, the highest of the Alps, it was called the M. B. Station, and meteorological instruments were later placed there, as well as at the summit.

From this hut a narrow path was made about one foot wide in the volcanic sand. By careful planning we almost entirely avoided the lava cliffs, where the construction of a path would have been too difficult and expensive. Indians were used for the work. They suffer very little from the altitude, but considerably from cold at night. They worked fairly well, but toward the last of the work considerable persuasion of one kind and another was necessary.

Let us now, taking our stand at the summit, face toward the east. On the left is seen the northern wall of the old crater, a perpendicular mass of yellow, sulphur-stained rock a hundred feet in altitude. At that point I first reached the edge of the crater. I had been climbing some distance on foot, and though I was near the border, owing to the uniform slope I seemed to be as far as ever. Panting for breath, stopping every few seconds to rest, all at once I staggered on the very edge and fell exhausted and dizzy with my head and arms over the side. The impressions of that first view have never been repeated.

In front of us is the Gateway, facing the Alto de los Huesos, and a little to the right the deep chasm of the new crater. From this summit it is impossible to see the bottom of the crater. Beyond, if the day is clear, we may see the Cordillera stretching in a great line of snow-capped peaks to the north and then to the west. Nearer us lie the Salinas, whose vast deposits of salts gleam in the sunlight like snow. Beyond, to the left, is the active volcano Ubinas, and to the right the range Pichu-Pichu.

If we wish to enter the ravine and go to the edge of the new crater, we shall need to descend from the cross along the edge of the old crater wall, always in sight of Arequipa. It will be well to take great care, while passing over the snow, not to slip, since, once started, one might perish by falling into the crater or by rolling a thousand feet down the side of the mountain.

As we descend, lava cliffs, invisible in Arequipa, rise close to us, beyond which we catch varied views of the crater.

We soon reach the break in the wall and enter the ravine. Looking north along this deep valley, we see a bank of sand and pumice sloping up to the foot of the lava cliffs from which we have just descended.

From this place we will slowly climb the steep bank of sand and snow to the inner border of the new crater. We now stand directly on its edge. Clouds of vapor are always rising from numberless apertures in the bottom. This, from the incessant motion of the sulphurous vapors, together with its rough, yellow surface, has the appearance of a boiling liquid. As a matter of fact, however, we have never seen either liquid or fire, but only vapor, which varies greatly in quantity but never disappears for an instant.

At times this vapor rises more than a thousand feet. At other times it runs along the bottom, driven about by the wind, which seems to strike the crater wall and be deflected downward. All along the border, especially on the eastern and southern sides, are numbers of small holes, some of them no larger than a pencil, from which hot sulphurous vapor is rapidly puffed.

The odor of sulphur is very strong, and, were the wind from the opposite side, it would be difficult or dangerous to pass so near the edge.

No one has ever yet descended to the bottom of this "new" crater. Very few of the many who have attempted to climb the volcano have even reached the outer border. Of these, fewer have passed through by the inner border and seen all its details, but no one has yet dared to think of descending into the "Inferno." It would not be impossible to descend. Toward the left is seen a steep slope of sand and rock. By fastening a rope at the crest and lowering himself by its help, a man might possibly reach the bottom. If not asphyxiated before his return, he might be pulled up by men stationed above.

If the bottom were strewn with gold or diamonds as thickly as it is with sulphur, probably men would be found to make the attempt.

The Indians fear it and told us that the person who should throw a stone into the bottom would not escape alive.

In passing the ruins of walls, referred to above, I asked my Indian guide, "What is this?" "God knows," he replied. "But to me it looks like the ruins of the rooms of a little house," I added. "It seems to me more like a corral," the guide replied. "But who would build a corral in such a place as this?" I asked. "The devil," was his concise answer; and he and the others showed evident anxiety to leave the devil's corral as far behind them as possible.

We shall not care to pass many hours in the crater. Aside from the mountain sickness, the cold becomes very intense as night approaches. At the summit, even at midday with a clear sky and in full tropical sunshine, the temperature of the air is generally below the freezing point, and at night in winter it descends to from ten to twenty degrees below zero C.

The strong wind makes the cold seem much greater, and the low atmospheric pressure causes more discomfort than the low temperature. At the summit the barometer stands at 14·9 inches, so that the pressure upon the body has been reduced from fifteen to seven and a half pounds to the square inch.

In going from the sea level to the summit of the Misti a pressure of something like seven tons is removed from the surface of a man's body, and it is, I believe, the difficulty which the human body has in adapting itself to this tremendous change which is the chief cause of mountain sickness, though lack of oxygen may exert an influence.

Instead of returning to the main summit, which would be very difficult, and thence to the M. B. hut by the path, we can return much easier and quicker by the "gateway."

Moving along by the northern wall toward the east, we pass a great rock near which camped for two or three days Herr Falb and Doctor Moscoso Melgar.

The distinguished traveler Doctor Weddell, who ascended the Misti and entered the gateway to this point, was very unfortunate. With the greatest energy, alone of all his party he succeeded in reaching the border of the crater at the gateway and entered the ravine. Here he looked about him, and seeing nothing but a wall of rock on one side and a high mound of sand on the other, expressed himself satisfied with his achievement, and as night was coming on, beat a hasty retreat without seeing the real crater at all. His description is a little pathetic and ludicrous; for the sand hill he compares to those on the pampas, and expressly states that while most volcanoes have some kind of respirator or mouth, nothing of this sort is seen in El Misti.

Perhaps this report accounts for the apparently unkind criticism of Doctor Paz Soldan, who, after claiming that no one ever reached the summit of El Misti, says: "It is very strange that the skillful naturalist Mr. Weddell should pretend to have gained the crater itself," etc.

As we pass out through the gateway, we see the M. B. hut more than 3,000 feet below us, and far away the Alto de los Huesos, with troops of llamas, like tiny ants, trooping along on their way to Arequipa.

The descent for the first few hundred feet is over broken lava and great rocks; then for a great distance between high walls of lava on either side, but in the loose volcanic sand.

Down this we stride with steps each one of which reaches six feet. No effort is necessary except to move the feet forward; gravity does the rest. Four or five hours it took our panting mules to ascend in the morning by the path, and men have struggled on foot for twelve hours to reach the crater by the route we descend; however, in thirty minutes, in the loose sand, we drop more than 3,000 feet and reach the hut; within a few hours more we may again be in Arequipa.

Some facts in regard to El Misti, its past and possible future, will have interest.

By simple vision it is difficult to judge of the relative distances of mountains, especially in a region where the air is as pure and transparent as in this region. Strangers have often remarked to me that apparently it is an easy walk from the city to the summit of El Misti. In fact, El Misti is nearer the city than the other great mountains. To the main summit of Charcharni the distance, in an air line, is about fourteen miles, to El Misti eleven, and to Pichu-Pichu nineteen miles.

Owing to this fact El Misti has generally been thought more lofty than Charcharni. It is, however, about 800 feet lower.

Various values have been given for the altitude of El Misti, from less than 17,000 to about 21,000 feet. Few or none of these, however, were careful measurements. The true height of the highest point above sea level is, I believe, a trifle over 19,000 feet.

The volcano has frequently been referred to by the old writers as the "Colossus."

The lower slopes of the volcano proper abound with deep, fine sand, in which the feet sink, and in which a path lasts but a short time. I feared at first that this same fine sand would be found on the higher slopes and render it impossible to construct any permanent path. On this particular I consulted the Indian named Quispe, who was said to be the best authority on the mountains. "Yes, it is sand," he said; "you make a path to-day, to-morrow where is it?" He was mistaken, nevertheless, for in fact the strong winds have removed the fine sand from the surface at high altitudes, leaving only fine pebbles, so that the path is reasonably permanent.

A question which has often been asked me is, "Do you believe that El Misti will ever again be in a state of violent activity?"

This question I cannot answer authoritatively. There is not, I believe, any really authentic account of violent eruption within historic times, though the amount of vapor which rises from it is constantly changing, and has been at times of such quantity as to excite alarm in Arequipa. So far as my observations go, the emission of vapor depends largely on the snow which falls in the crater. This melts and runs to the bottom, entering the numerous apertures there which lead to the heart of the mountain, where the heat is always sufficient to drive it forth, sooner or later, in the form of vapor, but with sulphurous vapors also, such as sulphureted hydrogen, sulphurous acid, etc.

As we have seen, the wall of the new crater is 500 or 600 feet high, and usually the vapor is dissipated before it reaches the rim, and is hence invisible from the city.

At times, however, during nearly every year, it rises a thousand feet or more above the bottom and then is seen from a distance. Early in January, 1894, I visited the summit. The whole top of the mountain was covered with snow, and an immense volume of vapor was rising from the crater, in such quantity that, from the meteorological station, the eastern wall of the new crater was at times entirely concealed. At rare intervals rumblings have been heard, at which times our guides have hastened to throw themselves at the foot of the cross for protection.

All this shows that El Misti, though it may be slowly dying, is not yet dead.

From the lack of historical evidence, the last eruption of the volcano could not have occurred within four or five centuries, and from what study I have been able to give to the subject, it is my opinion that the time may be reckoned rather by thousands than by hundreds of years.

The present form of the volcano was undoubtedly caused by at least two great eruptions. So far as I know, this was first suggested by the late Señor Juan de Romana. Thousands of years ago El Misti slowly rose to more than its present height, not, probably, by one supreme effort, but through long ages. As a result the volcano then had one crater of about 3,000 feet diameter and of unknown depth.

It is indeed probable that the close of these activities was marked by one grand eruption, now traced by enormous lava cliffs and deposits of pumice and ash for vast distances.

The fact that these deposits are in many places covered with other geological formations, and that they have been cut through by ravines of great depth, in a country where rain is very scant, testify to the great antiquity of this eruption.

Wearied with these activities the volcano slept, per-

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haps through many ages. Then came another period of activity, less grand and violent than before, and marked especially by the vast quantities of volcanic stone and sand, which must have made the whole region seem like night.

Again the monster slept; but will he wake again?

El Misti is not an extinct volcano. The vapor which always rises from its crater bears witness to great forces which still dwell within. It is true that the nature of the emanations from the volcano are such as are in many cases characteristic of volcanoes that are approaching total extinction, but there are exceptions, and the laws that govern them are not well understood. I believe it lies outside man's wisdom, at the present day, to predict with any marked success the future of volcanic or of earthquake activity. In spite of claims to the contrary, there is no knowledge which can predict with any certainty whether a violent earthquake will visit a given locality, e. g., Arequipa, within one or many years.

Vesuvius, in A.D. 79, after long ages of quiet, when the people had even forgotten that it was a volcano, gave an eruption which was one of the greatest in history. Later it was almost completely quiet for fifteen centuries, when it became active again. In the course of nature a thousand years are but as a day.

Will El Misti have a similar history?

I believe not, for the emanations from the crater indicate that it is slowly approaching extinction, but of this there is no certainty.

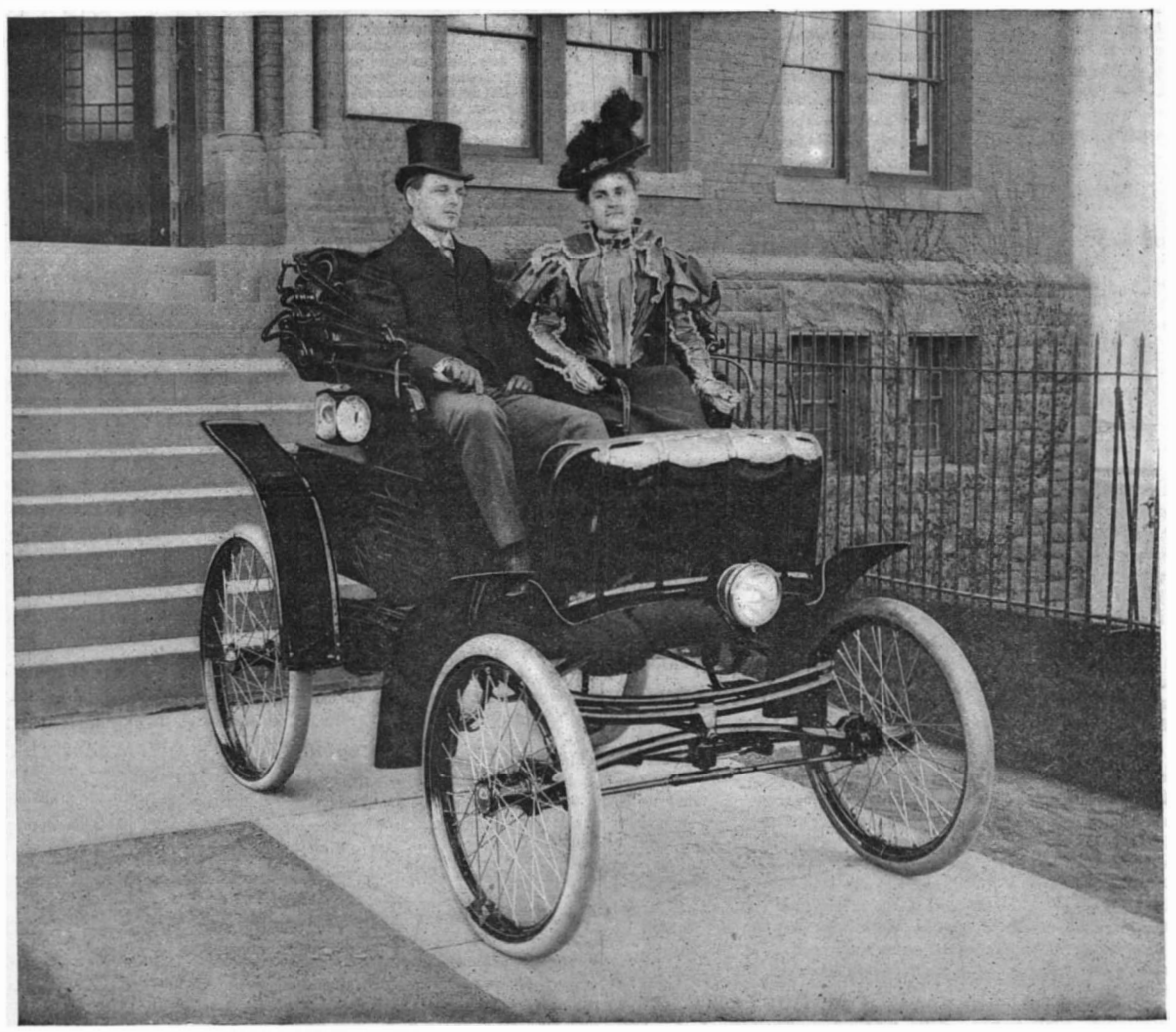
At least it may be pleasant to know that, in general, eruptions are less destructive than earthquakes, and that, unless extremely violent, an eruption of El Misti would be more interesting than dangerous.

THE COLUMBIA MOTOR CARRIAGE.

In January, 1895, the Pope Manufacturing Company, of Hartford, Conn., the well known manufacturers of the Columbia bicycle, decided to enter the horseless carriage field, and during the two years and a quarter which have elapsed since that date, elaborate investigations and experiments have been carried on without regard to expense to determine what is the best type of horseless carriage. The result of these experiments is a two-seated phaeton designed to be used for business or pleasure. The first public test of this interesting vehicle was held at Hartford on May 13 in the presence of a number of representatives of the scientific press of England and America. The particulars of the test which we give are furnished by the representative of the SCIENTIFIC AMERICAN who was present at the trial.

The frame is of the Pope Tube Company's 0·50 carbon steel, and the vehicle is equipped throughout with ball bearings, and possesses several of the features of bicycle construction which have made the Columbia wheel so famous. The wheels were fitted with heavy rubber pneumatic tires, which are practically unpuncturable, being used for 3,500 miles without being punctured. The general design of the carriage is shown in our engraving. The motor power is electricity, which is stored in four sets of batteries. There are forty-four cells in all. The current is used at a pressure of 110 volts. When once charged, the battery is sufficient to run the vehicle for thirty miles, and if the roads are good and free from mud, this distance may be increased. The motor is attached to the rear axle wheel of the carriage, where it is readily accessible. The motor is a little over two horse power. The rates of speed are four, the maximum being fifteen miles an hour and the others twelve, six and three miles an hour respectively. The entire weight of the carriage is 1,800 pounds, 850 of which is in the battery. The expense of charging the batteries is about fifty cents, so that it will be seen it only costs a trifle over a cent a mile to run it, which only goes to prove that the horseless carriage is an extremely economical vehicle.

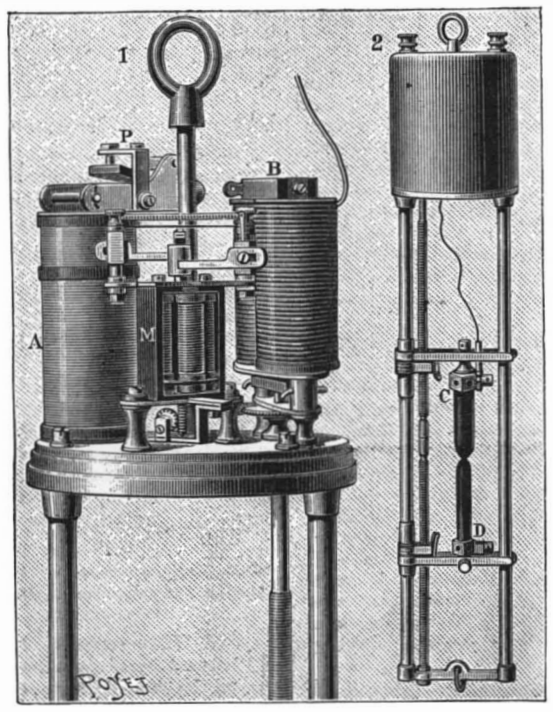
The exhibition of carriages on the day of the test was under the direction of Lieut. Harold H. Eames, manager of the motor carriage department, assisted by Mr. Hiram Percy Maxim, a mechanical engineer and other officials of the department. The speed test showed that the carriages were able to take sharp grades at ordinary speed, and that the carriage is stopped and started slowly or rapidly by turns on a sharp downward incline. The guests of the company were allowed to run the carriages themselves, and it was found that those who were totally unfamiliar with the horseless carriage were able to manage and turn them with as much ease and success as they would have guiding the gentlest horse, which only shows that no previous apprenticeship is necessary for one to be able to run an electric horseless carriage.



THE COLUMBIA MOTOR CARRIAGE, TESTED MAY 13.

AN ARC LAMP THAT OPERATES IN ANY POSITION.

There are very few regulators that permit an electric lamp to operate in all positions. Those that do exist



ELECTRIC LAMP FOR OPERATING IN ANY POSITION.

(there are, perhaps, two or three) are very high priced. All the rest, which are very satisfactory when the lamp is left horizontal, operate irregularly, or even do not operate at all, if they be inclined. This is explained by the fact that their mechanism is based upon the action of gravity to obtain the descent of the upper carbon. The use for which they are generally designed, that is to say, for public or private lighting, requires no other position. In lanterns for projections, however, it is often of advantage to be able to incline the apparatus slightly, although the limits of inclination prejudicial to the operation of the regulator are rarely exceeded. This may happen, nevertheless; but it is rather in theater projectors, that are designed to throw a luminous pencil upon a given point of the stage, that it is indispensable to be able to incline the apparatus strongly and even to exceed 45°. It then becomes necessary to use lamps in which the juxtaposing of the carbons is effected by hand, and a man is required near each projector. If the action of the carbons is to be prolonged, it would be preferable to have automatic lamps. Mr. Mougin has recently devised a type of regulator that seems to us capable of being utilized with advantage in such cases. The bringing together of the carbons is entirely independent of gravity, whatever be the position of the apparatus.

To this effect, the two carbons are mounted upon cross pieces, C and D, sliding upon two rods. A third rod, passing through the cross pieces, is threaded in such a manner that, upon being made to revolve in one direction, the two cross pieces, and, consequently, the carbons that they carry, approach each other. Now, this motion of the threaded rod takes place every time that the carbons become so worn that they need to be brought together. It is produced by a small electric motor, M, which transmits the rotary motion to the rod in question through the intermedium of a bevel wheel. The current traverses the motor and sets it in operation only at the moment desired, because it is mounted in derivation upon the circuit, and the interrupter, P, severs the communication as long as the arc has its normal length. But if the arc happens to elongate, the resistance increases and a part of the current passes through the fine wire bobbin, A, which then attracts the armature of the interrupter, P, and closes the circuit of the motor.

The coarse wire bobbin, B, is mounted in the circuit, and, as soon as the current passes, attracts the armature, which is connected with the cross piece that carries the upper carbon, and thus effects the separation of the carbons for the beginning of the operation. Such initial separation is regulatable by hand, and, once effected, is maintained through the mechanism of which we have above spoken.

These lamps are now constructed, in the form shown in our engraving, for use in general lighting. By slightly modifying their form in such a way that the regulating mechanism shall be inclosed in a base capable of being placed upon a table, the manufacturer may adapt them for use in lanterns and projectors.—La Nature.

Mysteries of the Persian Gulf.

Sir Henry Mance recently, in his inaugural address as president of the Institution of Electrical Engineers, speaking of the development of oceanic telegraphy, said in the Persian Gulf one occasionally witnessed natural phenomena which to the untraveled might appear incredible. In the midst of the mountains near Mussendom he had seen during a thunderstorm such displays of lightning as baffled description. He had, at certain seasons of the year, observed the water in the bay—which was large enough to hold all the fleets of the world—present exactly the appearance of blood. Not many miles from Mussendom he had witnessed mysterious fire circles flitting over the surface of the sea at a speed of 100 miles an hour—a phenomenon which no one had yet been able to explain. While steaming along the coast of Belochistan, he had been called from his cabin at night to observe the more common phenomenon of a milky sea, the water for miles around being singularly white and luminous. In the same locality the sea was, for short periods, as if putrid, the fish being destroyed in myriads, so that to prevent a pestilence measures had to be taken to bury those cast up on the beach. This phenomenon was doubtless due to the outbreak of a submarine volcano and the liberation of sulphureted hydrogen. In these waters jellyfish were as large as footballs, and sea snakes of brilliant hue were met with in great numbers. On one occasion a swarm of sea snakes forced their way up one of the creeks in Karachi Harbor, apparently for the purpose of having a battle royal, for the ground between high and low water mark was thickly covered with their bodies in positions betokening a deadly struggle.

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RECENTLY PATENTED INVENTIONS.

Engineering.

GAS OR OIL ENGINE.—Frank S. Mead, Montreal, Canada. This engine has an air compression chamber and a connection from the working cylinder thereto, there being an independent connection from the working cylinder to the oil supply tank and a third connection from the compression chamber to the oil supply tank, the explosive mixture being properly prepared and delivered to the working cylinder in such condition and manner as to secure the best results both as to the efficiency and economy of the engine.

FUEL LOADER FOR ENGINE TENDERS.—John K. McKinnon, White Oak, Ga. This apparatus comprises a platform which supports a vertical rotary shaft carrying radial arms to the ends of which are secured a longitudinally curved band, hangers depending from the arms and a carrier being pivotally connected between each pair of hangers, there being means for automatically locking the hangers and the carrier. The wood or other fuel is placed in the carriers before the arrival of a train, and when the tender is in front of the platform the shaft is rotated to bring the fuel carriers over the tender, the carriers being then discharged by pulling on a cord or wire. The improvement may also be employed in wood or coal yards, or for loading boats, etc.

ROCK DRILL.—Warren Wood. Paterson, N. J. An improved head for rock drills is provided by this invention, according to which the steam packing is placed at the base of the head or close to its connection with the steam cylinder, that any lateral pressure on the drill rod or piston rod will have no perceptible effect on the packing, preventing the escape of any portion of the motive agent and prolonging the usefulness of the drill head. When the drill is placed at an acute angle it is frequently the case that a new stuffing box or gland will have to be often supplied—a difficulty which this invention is designed to overcome.

Mechanical.

BEARING BLOCK FOR SCREW SHAFTS.—Richard M. Melhuish, London, England. In bearings for feed screw shafts for sewing machines, line engraving machines, etc., this inventor has devised an improvement designed to prevent shaking or jarring of the feed screw, to enable slack to be taken up, and to insure such motion of the feed screw shaft as will prevent liability of its overunning its actuating gear by its acquired momentum. In combination with the screw shaft is a nut comprising a metal portion and a yielding portion, capable of being softened by a liquid without destroying its integrity, the two portions being held longitudinally together, and a clamp plate engaging the outer side of the yielding portion. The feed nut is of peculiar construction and is formed one-half of metal and the other half of gutta percha, leather, wood, horn, etc.

MACHINERY FOR MAKING SLABS OF PLASTER, CEMENT, ETC.—Richard W. Hitchins, London, England. This machine comprises a supporting table, pairs of pressing rollers and endless bands between which the plastic material passes, a hopper in which rotary arms stir the material and feed it to the bands, and a rotary cutter for cutting the material into lengths. The machine is designed to produce slabs of plaster, cement or composition for making ceilings or facing walls, a strengthening web or fabric being attached upon either or both of the surfaces of the layer, which is cut into lengths as fast as produced.

WIRE BELT LACING.—John Gregory, Newark, N. J. This invention provides a metal lacing consisting of a wire passed through the belt at the end, and carried beyond the end to form a series of aligned eyes, the arrangement of the strands being similar to the thread of a screw, while a binding of corresponding form is secured to the belt and carried between the members of the wire lacing and over to an engagement with the ends of the belt. The improvement is especially adapted for use with woven belts, the lacing not drawing from one weft of the belt, but its strain being distributed over a larger area of the belt than ordinarily, effectually preventing unraveling of the ends of the belt.

Agricultural.

PLOW.—Antoine Cayatte, Baudonvilliers, France. This invention relates to wheelless plows, called Belgian plows, the improvement enabling a single person to hold several plows at the same time. A pivot pin is mounted to swing on the stanchion and connected with the plowbeam, a screw being universally mounted on the stanchion and a block adjustable longitudinally on the screw and transversely on the plow beam.

Miscellaneous.

BICYCLE HANDLE.—Peter C. Peterson, Alexander Valley, Cal. This inventor has devised a handle which may be readily removed from the handle bar, or which may be automatically locked to the bar in such manner as to render the parts virtually integral. Near the end of the tubular handle bar is a partly returned slot, and the hollow handle has an inward bearing surface and carries a straight spring, while a rod projecting into the handle proper is capable of entering the slot in the handle bar, the spring having its ends bearing against the handle bar to hold the rod in the slot, and being flexed around the bearing surface as the rod is placed and displaced in the slot.

TIRE REPAIRING TOOL.—Frank H. Mayer, Denver, Col. This invention provides a small, partially compressible reservoir, adapted to contain a liquid cement, the latter being forced out by pressure through a straight tubular outlet, movable in which is a needle shank. The needle point is bulb-shaped, and when not in use is inclosed by a cover. The point is forced through a puncture to the interior of the tire, and then the liquid cement is forced in around the needle shank, to spread around the head of the needle in ring form, a certain amount of the cementing material being drawn into the puncture as the tool is withdrawn.

WALLING EXCAVATIONS.—William C. Thomas, Fountain, Kansas. For walling wells, cisterns, root pits, silos, etc., according to this invention, a frame is provided to rest on the ground at the upper end of the pit, a windlass carrying a ratchet wheel rotating in the frame, while three ropes extend from the windlass to connections with a platform on which a gage frame is removably mounted. The device may be raised and lowered in a pit to form a gage around which a wall may be built, the platform supporting the workmen and the loose material.

BARREL FILLING APPARATUS.—Joseph E. J. Goodlett, No. 181 Tennessee Street, Memphis, Tenn. In fillers for liquid receptacles having a valve attachment to automatically cut off the flow when a receptacle is filled to the required limit, this inventor has devised an improvement comprising a tube, gooseneck, valve float, float rod, pivoted trigger and valve lever, in combination with a compound float lever formed of two parts pivoted together and pivoted separately at fixed points, one part being connected with the float rod and the other having a shoulder that engages the trigger. When this apparatus is used in a barrel a vacant space may be left over the liquid as desired.

GAS MANUFACTURING.—Augustus S. Cooper, Santa Barbara, Cal. This inventor has devised an apparatus for manufacturing illuminating and other gas from crude petroleum, in which the gas is fixed in a short time and the tar and other liquid hydrocarbons are readily separated and discharged by themselves. The apparatus comprises a casing connected with a hydrocarbon vapor supply and in which concentric wire cages are mounted to revolve in opposite directions, the wires being electrically heated to rapidly decompose the vapors. The cages are to be revolved at a very great speed, and it is designed that the operation of decomposing the vapors will be effected in a small fraction of a second.

IMPROVED IRONING TABLE.—Howard Rupert, Carlisle, Cumberland County, Pa., P. O. box 324. This invention provides a simple, inexpensive and durable ironing table, which may be conveniently folded and stored in small space, and which, when set up for use, has a convenient support for holding the articles ironed. The board has a tapering end, which rests on a trestle, and at its other end is a hinged leg, whose inclination may be varied to raise or lower this end of the table. A wire frame covered by canvas is removably held low down inside the table legs to form a support for the clothes, and on the top of the ironing board, at one end, is held a curved sleeve board, which may be reversed to bring either edge on top, to facilitate the proper ironing of sleeves or other garments.

HARNESS ATTACHMENT.—Joseph M. Tilman, Evansville, Ind. This attachment enables the driver to check up or loosen the check rein without leaving the vehicle. It consists of a fixture secured to the saddle, and having an opening in which is a spring and a plunger, the latter being adapted for attachment to the check rein. The driver, in adjusting the check rein as desired, uses a rod which is adapted to be hooked into a handle ring of the attachment. The device may be applied to any form of harness.

WAGON END GATE.—Charles Schalles, Cortez, Col. According to this invention bearing plates embrace the ends and top of the sideboards, links being connected with the plates and brackets projected from them, while the end board has a rocking lock bar journaled in the brackets, the lock bar terminating at its ends in crank arms arranged to receive the links. The end plate may be quickly put in place or removed from the wagon body, and when the end gate is locked in position its bottom and ends fit snugly to the bottom and sides of the wagon body.

SEWING MACHINE QUILTER.—George A. Tressler, Americus, Kansas. To enable an ordinary sewing machine to be used for quilting, this invention provides an attachment in which a carriage movable on guide tracks carries feed rollers and a take up roller, gearing connecting an endless belt with the sewing machine, while a clutch mechanism carried by the carriage engages the belt. When started, the carriage with the quilt are automatically carried forward to the completion of one row of stitches, after which the carriage is moved back to its starting point, and the sewing machine may be moved in or out before starting on another row of stitching.

RUG FASTENER.—Isabel N. Veal, Howard, Col. For removably securing a rug to a carpet, so that the edges of the rug will not be liable to be turned up, this inventor employs a fastener consisting of a staple or double pointed pin, in which the loop or portion joining the two shanks is bent forward over the shanks, in connection with a rug engaging device consisting of a separable hook having two bends, one of which engages the loop of the staple while the other has sharpened points to engage the rug.

PICTURE EXHIBITOR.—George W. Brown, Colorado Springs, Col. This is a device for use in connection with a phonograph in such way that the parts whereon the pictures are mounted may be moved to cause the pictures to pass successively across a sight opening by the movement of the motor of the phonograph. The invention comprises a casing to be used in connection with a phonograph, movable picture carrying parts being arranged in the casing and carrying pictures, while there are means for illuminating the pictures and gearing for driving either of the parts from the motor, whereby either of the parts may be driven while the other is held stationary.

PORTABLE FIRE ESCAPE.—Spencer F. Brown, Lake Linden, Mich. This fire escape comprises a truck on which is mounted a ladder adapted to be swung into vertical and horizontal positions, arms having pivotal connection with the ladder and slotted brace arms having pivotal connection with its upper portion, while a rod connects the first arms and passes through the slots in the brace arms. The truck carries a series of ladders which may be quickly elevated or placed in desired position on arriving at the scene of a fire, or compactly folded to take up but little space.

NAME PLATE FOR UMBRELLA CLOSING BANDS.—John Hasselbring, Brooklyn, N. Y. This device consists of a bottom plate secured to the socket member of an ordinary glove fastener, and in a convex name plate secured to the bottom plate and inclosing the socket of the fastener. It is designed for the embellishment of the closing band of the umbrella, improving its appearance, and at the same time forming an identifying mark for the owner.

COMB BACK.—John Walton, Philadelphia, Pa. This invention provides a metal comb back for a comb to be anchored to a cord or chain and suspended in toilet rooms or public dressing rooms. It is made of a single piece of tubular metal having in its upper edge two parallel and longitudinal slits, with the metal between raised above the level of the rest of the back to form an anchorage loop.

SAFETY POCKET.—Edward H. Burger, Duluth, Minn. Against the inner side of a vest pocket, according to this invention, is secured a face plate, and in the front wall of the pocket is secured a frame plate with a rubber binding piece from which project flexible teeth. The device is designed to securely hold in place pencils, penholders and other articles, no matter what position the wearer may take, the device holding a partly used pencil within convenient reach, instead of its being at the bottom of the pocket.

Designs.

TROUSERS HANGER.—Ward Evans, Washington, D. C. This article is made of a single piece of bent wire, and has hooklike or loop portions extending laterally at right angles from a shank portion which terminates in a coil.

LADY'S BELT.—Louis Sanders, Brooklyn, N. Y. In this belt the upper and lower lines are inclined downward from the sides to the front and rear, the lines meeting at an obtuse angle and forming a point at the front and at the rear. There is also a buckle at each side, near the front of the belt.

BELT BUCKLE.—John Mehle, Jr., Jersey City, N. J. The rear ends of the side members of this buckle are bent downward, forming ears in which is supported the bar carrying the tongue, and the outer edge of the buckle is formed with a beadlike design.

BOTTLE.—William H. Cropper, Wellsburg, West Va. This design is intended to afford a combination of curved surfaces which will give a beautiful effect, and also provide a bottle of such shape that it will be less liable to breakage.

DRIP CUP.—Aaron N. Dukes, Peru, Ind. This cup has an approximately oval-shaped body, from opposite sides of which are upwardly projecting arms on the ends of which are lugs.

HOOD FOR STEREOSCOPES.—Herbert S. Walbridge, North Bennington, Vt. This hood is elliptical in form, and has at its front a lens frame, the lines of the edge of the hood being in curves. At the bottom of the hood is a bridge piece of inverted V shape, presenting a division wall between the lenses.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co. for 10 cents each. Please send name of the patentee, title of invention, and date of this paper.

Notes & Queries

HINTS TO CORRESPONDENTS.

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References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

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(7161) F. C. S. asks: Will you kindly let me know what are the principal mixtures of washing compounds? A. 1. The so-called English washing crystal is an impure, half efflorescent crystallized soda, containing a large proportion of sulphate of soda and common salt. 2. Under the name of washing crystals simply a filtered solution of borax and soda has been introduced. 3. The English patent cleansing crystal washing powder is a half efflorescent soda, containing about 25 per cent of Glauber's salts. 4. The washing and cleansing crystals are pure crystallized soda, with 1 to 2 per cent borax. 5. Krimmelbein's wool washing composition is a mixture of 35 parts of dried soda, 10 parts of soap powder, and 10 parts of sal ammoniac. 6. Ward's wool washer is a mixture of 90 parts of effloresced soda crystals with 10 parts of soap powder. 7. The universal washing powder (Henkel's) is a water glass containing soda, with a small percentage of tallow soap and starch powder. 8. Hudson's soap extract is a mixture of crystallized soda and soda soap, containing water (soap 14·3, anhydrous soda 30, and water 55). 9. A washing powder for the finest white linen is a powdery mixture of 90 parts of effloresced soda with 10 parts of hyposulphite of soda and 2 parts of borax.

(7162) J. B. B. asks: I have an eight light 16 candle power 110 volt dynamo, but by using 52 volt 16 candle power lamps I can light 16. If it will light sixteen 52 volt lamps, will it light the same number of 110 volt lamps? Of course, I run the 52 volt lamps in multiples of two. Kindly give me information on this point. A. You are undoubtedly running your dynamo rather too hard with the 52 volt lamps or else its rating is on a very conservative basis. You cannot, we think, substitute one 110 volt lamp for two 52 volt lamps, on account of the extra six volts.

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MAY 11, 1897,

AND EACH BEARING THAT DATE.

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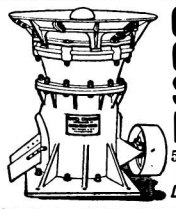

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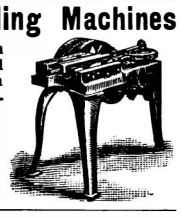

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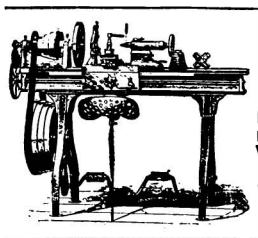

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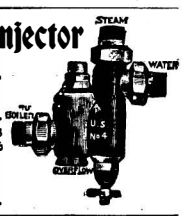

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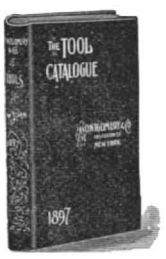

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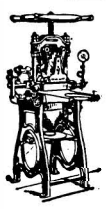

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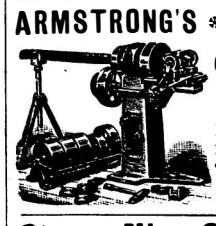

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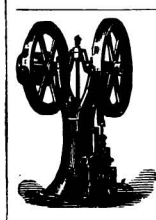

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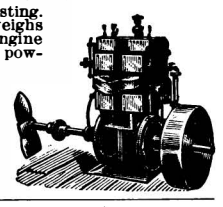

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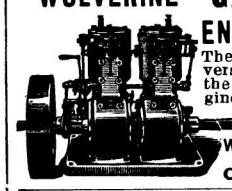

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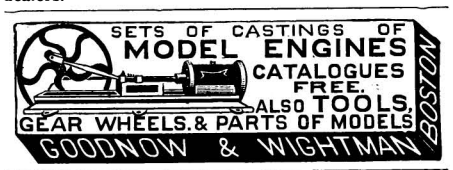

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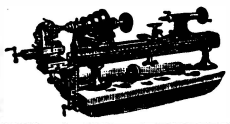

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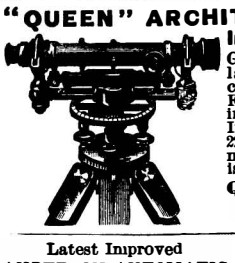

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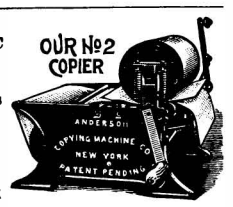

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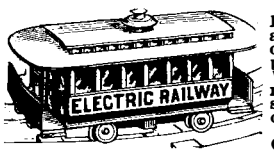

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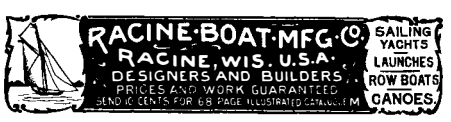

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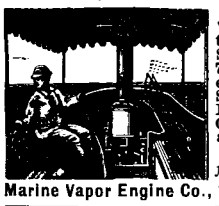

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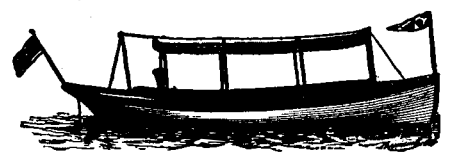

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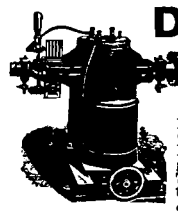

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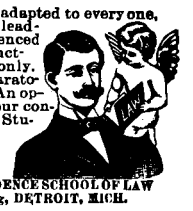

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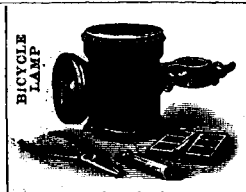

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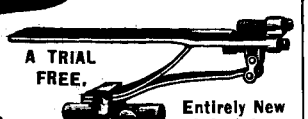

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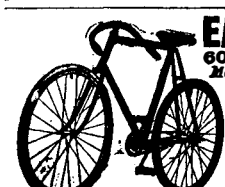

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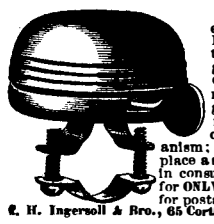

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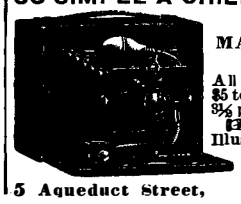

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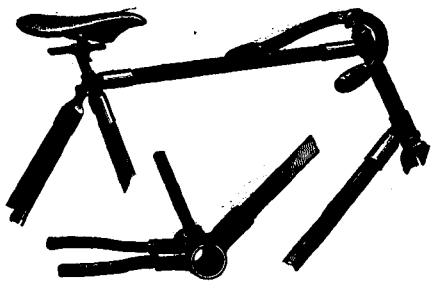

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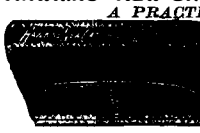

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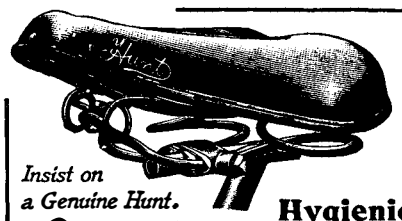

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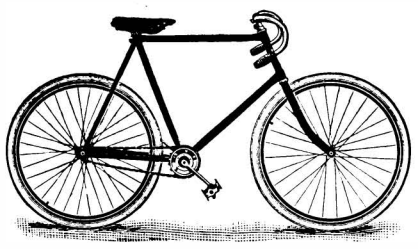

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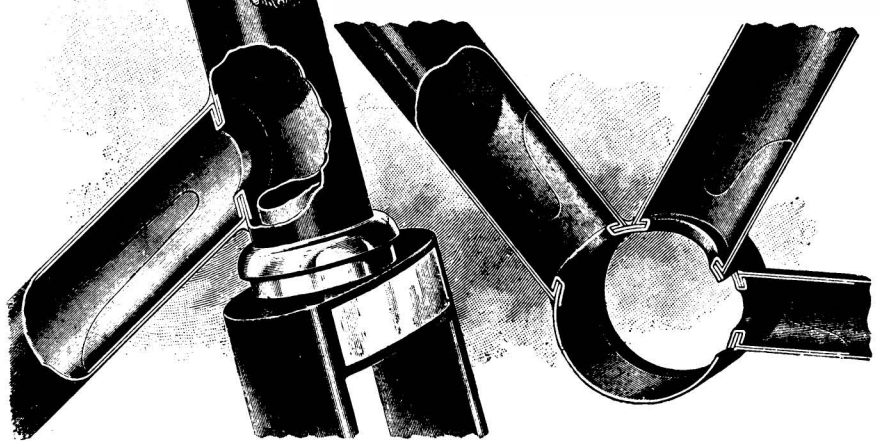

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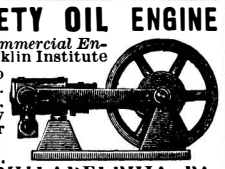

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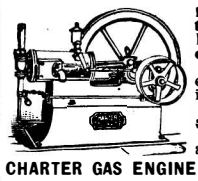

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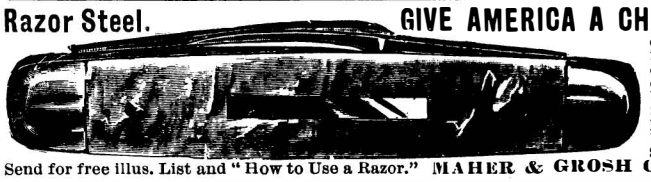

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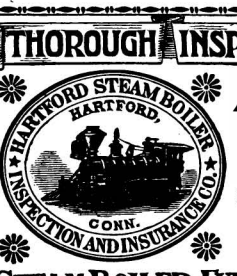

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